

Gelman Sciences Inc.
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CASE NARRATIVE

Monthly Data Gelman Sciences

Project: 1,4-Dioxane Remediation

Date: October 2021

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition, all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Gelman Sciences Inc. attests to the validity of the laboratory data generated by Gelman Sciences Ann Arbor, Michigan Environmental Laboratory facilities reported herein. All analyses performed by Gelman Science's Environmental Laboratory facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Gelman Science's Environmental group has reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

At the end of the month some of the 1,4-dioxane samples were sent to Ann Arbor Technical Services for analysis due to a reproducibility problem. The balance of the samples was analyzed for 1,4-dioxane at Gelman Science's Environmental Laboratory. All bromate samples were analyzed by Gelman Science's Environmental Laboratory. The test results in this report meet all NELAP requirements for parameters for which accreditation are required or available. Any exceptions to NELAP requirements are noted in this report. All exceptions are noted per laboratory standard operating procedure based on EPA Method 1624c. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results. The odd even rule is used for rounding. Holding times were met for all samples analyzed. Proper preservation was observed on all samples unless otherwise detailed in the individual sections below.

RECEIPT/ STORAGE

The samples were received on the days noted in the report for the Month; the samples arrived in good condition, properly preserved and on ice when necessary. Samples that require 1,4-dioxane analysis are collected in hydrochloric HCl acid-preserved vials to a pH of ≤ 2 , except for the Pall ozone treatment samples. These samples have chemicals that, when mixed with the HCl acid, cause interferences and trap damage. Every attempt is made to analyze these samples within 24 hours of receipt.

Samples that require Bromate analysis are collected and preserved in the laboratory with ethylene di-amine and refrigerated.

Samples that are delivered to the laboratory the same day as they are collected are likely not to have reached a fully chilled temperature. This is acceptable as long as there is evidence that chilling has begun. All samples are iced or refrigerated at 4°C ($\pm 2^\circ\text{C}$) from the time of collection until sample preparation or analysis.

1,4-Dioxane (GC-MS)

All ground water and treated water samples were analyzed for 1,4-Dioxane (GC-MS) in accordance with EPA 1624C, which has been modified to enhance detection limits. Samples that were diluted to bring them within the calibrated range of the instrument are noted with a "D" under the Qualifier Code section of the data report. Reporting limits were adjusted based on each dilution.

Reporting limit for undiluted samples is 1ppb (part per billion, micrograms per liter, $\mu\text{g/L}$). All quality control parameters were within the acceptance limits for reported samples unless indicated.

Bromate (Ion Chromatography)

All surface water and treated samples were analyzed for Bromate (Ion Chromatography) in accordance with EPA 300.1. Surrogates are added to all samples. All quality control parameters were within the acceptance limits with the balance of sample analyzed.

The reporting limit for treated samples is 5.0ppb and for surface samples is 2.0ppb.

Qualifiers**1,4-Dioxane Qualifier Codes:**

<i>Qualifier Code</i>	<i>Description</i>
nd:	The compound was analyzed for, but not detected at or above the detection limit indicated.
D:	Analyte value quantified from a dilution; reporting limit is raised to reflect dilution.
E:	The compound result is greater than the upper quantitation limit in the associated calibration curve, reported as estimate.
B:	The sample vials contained air bubbles larger than 5mm, which may affect compound results.
J:	The compound was positively identified; the associated numerical value is the approximate concentration.
M:	Matrix effects, sample required dilution.
R:	The reported value is unusable and rejected due to variance from quality control criteria.
V:	The reported value is considered estimated due to variance from quality control criteria.
H:	Sample was analyzed past 14-day hold time, but within 45 days.
O:	Samples analyzed in outside laboratory.
S:	Samples split with DEQ.

Bromate Qualifier Codes:

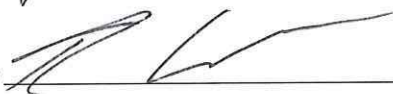
<i>Qualifier Code</i>	<i>Description</i>
nd:	The compound was analyzed but was not detected at or above the detection limit indicated.
E:	The compound result is greater than the upper quantitation limit in the associated calibration curve.
J:	The compound was positively identified; the associated numerical value is the approximate concentration.
R:	The reported value is unusable and rejected due to variance from quality control criteria.
V:	The reported value is considered estimated due to variance from quality control criteria.
H:	Sample was analyzed past 28-day hold time

Analyst: Gage M. Trendel



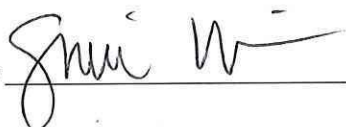
Date: 11/10/21

Report Checked by: Ray Woods



Date: 11/10/21

Report Checked by: Sheri Weintraub



Date: 11/10/2021

Sample Analysis Report

October, 2021

642 South Wagner Road
Ann Arbor, MI 48103-9019 US
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Analyst Initials: _____

Date: _____

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
Extraction Wells								
C3								
DOLPH-10-12-21-14:05-1	120	5						o,d
DOLPH-10-13-21-11:10-2					220	40		
DOLPH-10-13-21-11:10-1	120	10						o,d
TW-14-10-05-21-09:15-2					37	40		
TW-14-10-05-21-09:15-1	100	10						o,d
TW-14-10-14-21-11:00-2					84	40		
TW-14-10-14-21-11:00-1	110	5						o,d
TW-14-10-21-21-10:15-2					41	40		
TW-14-10-21-21-10:15-1	110	2						o,d
TW-14-10-28-21-10:30-2					56	20		
TW-14-10-28-21-10:30-1	110	4						o,d
TW-20-10-18-21-12:40-2					190	40		
TW-20-10-18-21-12:40-1	830	10						o,d
TW-20-10-26-21-10:45-2					130	20		
TW-20-10-26-21-10:45-1	720	10						o,d
TW-24-10-05-21-09:25-2					230	40		
TW-24-10-05-21-09:25-1	1900	40						o,d
TW-24-10-15-21-10:28-2					370	40		
TW-24-10-15-21-10:28-1	1800	40						o,d
TW-24-10-21-21-10:35-2					200	40		

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
TW-24-10-21-21-10:35-1	1900	40						o,d
D2								
LB-1-10-26-21-10:30-2					220	20		
LB-1-10-26-21-10:30-1	290	10						o,d
LB-4-10-13-21-10:25-2					160	40		
LB-4-10-13-21-10:25-1	430	10						o,d
TW-21-10-13-21-10:55-2					110	40		
TW-21-10-13-21-10:55-1	240	10						o,d
TW-5-10-05-21-09:05-2					38	40		
TW-5-10-05-21-09:05-1	610	20						o,d
TW-5-10-14-21-10:50-2					100	40		
TW-5-10-14-21-10:50-1	590	40						o,d
TW-5-10-21-21-13:30-2					68	40		
TW-5-10-21-21-13:30-1	630	20						o,d
E								
TW-11-10-05-21-09:10-2					120	40		
TW-11-10-05-21-09:10-1	160	10						o,d
TW-11-10-14-21-10:55-2					170	40		
TW-11-10-14-21-10:55-1	160	10						o,d
TW-11-10-21-21-13:35-2					84	40		
TW-11-10-21-21-13:35-1	160	5						o,d
TW-17-10-05-21-09:20-2					68	40		
TW-17-10-05-21-09:20-1	100	10						o,d
TW-17-10-14-21-11:05-2					63	40		
TW-17-10-14-21-11:05-1	77	5						o,d
TW-17-10-22-21-10:30-					47	40		
TW-17-10-22-21-10:30-1	77	5						o,d

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
TW-18-10-13-21-11:00-2					110	40		
TW-18-10-13-21-11:00-1	260	10						o,d
TW-23-10-13-21-10:30-2					230	40		
TW-23-10-13-21-10:30-1	380	10						o,d
TW-29-10-01-21-10:30-1	450	20						o,d
TW-29-TW-29-10-13-21-10:45-2					220	40		
TW-29-TW-29-10-13-21-10:45-1	290	10						o,d
Marshy								
PW-1-10-13-21-11:05-2					160	40		
PW-1-10-13-21-11:05-1	760	10						o,d
PW-1-10-26-21-10:40-2					150	20		
PW-1-10-26-21-10:40-1	640	10						o,d
SW								
TW-22-10-01-21-11:15-2					4.6	40		
TW-22-10-01-21-11:15-1	450	10						o,d
TW-22-10-13-21-11:15-2					34	40		
TW-22-10-13-21-11:15-1	420	10						o,d
TW-22-10-21-21-10:25-2					6.4	40		
TW-22-10-21-21-10:25-1	400	10						o,d
TW-28-10-13-21-11:20-2					140	40		
TW-28-10-13-21-11:20-1	640	10						o,d
TW-28-10-21-21-10:30-2					89	40		
TW-28-10-21-21-10:30-1	490	10						o,d
Monitoring Wells								
C3								
MW-18d-10-11-21-13:00-1	56	1.0						o

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
MW-22-10-11-21-14:25-1	2100	100						o,d
MW-32-10-11-21-09:16-1	15	1.0						o
MW-34s-10-08-21-10:16-1	nd	1.0						o
MW-35-10-07-21-11:30-1	2	1.0						o
MW-38s-10-08-21-11:38-1	nd	1.0						o
D0								
A2 Cleaning Supply-10-04-21-11:40-1	51	1.0						o
MW-53d-10-04-21-09:49-1	nd	1.0						o
MW-53i-10-04-21-12:37-1	38	1.0						o
MW-53s-10-04-21-11:11-1	nd	1.0						o
D2								
MW-107-10-14-21-14:10-1	530	20						o,d
MW-11d-10-07-21-14:20-1	260	10						o,d
MW-121s-10-29-21-11:14-1	nd	1.0						o
MW-129i-10-14-21-10:08-1	nd	1.0						o
MW-129s-10-14-21-11:18-1	nd	1.0						o
MW-34d-10-08-21-09:01-1	nd	1.0						o
MW-38d-10-08-21-12:50-1	41	1.0						o
MW-4d-10-07-21-13:01-1	340	10						o,d
E								
MW-103s-10-05-21-13:44-1	82	1.0						o
MW-104-10-06-21-12:32-1	26	1.0						o
MW-110-10-06-21-13:50-1	120	10						o,d
MW-112i-10-05-21-11:45-1	9	1.0						o
MW-112s-10-05-21-10:36-1	3	1.0						o
MW-121d-10-29-21-12:23-1	nd	1.0						o

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
MW-129d-10-14-21-12:27-1	2	1.0						o
MW-64-10-11-21-10:59-1	42	1.0						o
MW-66-10-07-21-10:01-1	2	1.0						o
MW-76i-10-06-21-09:50-1	100	10						o,d
MW-76s-10-06-21-11:11-1	270	10						o,d
MW-84s-10-04-21-14:05-1	500	10						o,d

SW

MW-10d-10-12-21-13:31-1	120	10						o,d
MW-45d-10-12-21-10:53-1	760	10						o,d
MW-45s-10-12-21-09:40-1	6	10						o
MW-46-10-13-21-12:25-1	72	1.0						o
MW-48-10-13-21-09:11-1	15	1.0						o
MW-49-10-13-21-10:33-1	nd	1.0						o
MW-50-10-13-21-13:53-1	500	20						o,d
MW-52s-10-12-21-12:20-1	190	1.0						o,d

Surface Water

Not Applicable

HC/HR-10-01-21-10:10-1			nd	2.0				
HC/HR-10-04-21-10:20-1			nd	2.0				
HC/HR-10-05-21-09:45-1			nd	2.0				
HC/HR-10-06-21-09:20-1			nd	2.0				
HC/HR-10-07-21-09:55-1			nd	2.0				
HC/HR-10-08-21-09:30-1			nd	2.0				
HC/HR-10-11-21-09:25-1			nd	2.0				
HC/HR-10-12-21-09:50-1			nd	2.0				
HC/HR-10-13-21-10:10-1			nd	2.0				

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
HC/HR-10-14-21-10:10-1			nd	2.0				
HC/HR-10-15-21-09:10-1			nd	2.0				
HC/HR-10-18-21-10:25-1			nd	2.0				
HC/HR-10-19-21-09:15-1			nd	2.0				
HC/HR-10-20-21-09:45-1			nd	2.0				
HC/HR-10-21-21-10:05-1			nd	2.0				
HC/HR-10-22-21-10:00-1			nd	2.0				
HC/HR-10-25-21-09:05-1			nd	2.0				
HC/HR-10-26-21-10:00-1			nd	2.0				
HC/HR-10-27-21-09:45-1			nd	2.0				
HC/HR-10-28-21-10:00-1			nd	2.0				
HC/HR-10-29-21-12:00-1			nd	2.0				

Treatment System

OUTFALL-10-03-21-2			7.0	5.0				
OUTFALL-10-03-21-1	6	1.0						o
OUTFALL-10-04-21-2			10	5.0				
OUTFALL-10-04-21-1	5	1.0						o
OUTFALL-10-05-21-2			8.4	5.0				
OUTFALL-10-05-21-1	5	1.0						o
OUTFALL-10-06-21-2			8.2	5.0				
OUTFALL-10-06-21-1	6	1.0						o
OUTFALL-10-07-21-2			8.4	5.0				
OUTFALL-10-07-21-1	6	1.0						o
OUTFALL-10-10-21-2			10	5.0				
OUTFALL-10-10-21-1	6	1.0						o
OUTFALL-10-11-21-2			12	5.0				
OUTFALL-10-11-21-1	6	1.0						o

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
OUTFALL-10-12-21-2			11	5.0				
OUTFALL-10-12-21-1	5	1.0						o
OUTFALL-10-13-21-2			12	5.0				
OUTFALL-10-13-21-1	4	1.0						o
OUTFALL-10-14-21-2			12	5.0				
OUTFALL-10-14-21-1	5	1.0						o
OUTFALL-10-17-21-2			19	5.0				
OUTFALL-10-17-21-1	5	1.0						o
OUTFALL-10-18-21-2			14	5.0				
OUTFALL-10-18-21-1	7	1.0						o
OUTFALL-10-19-21-2			9.4	5.0				
OUTFALL-10-19-21-1	8	1.0						o
OUTFALL-10-20-21-2			9.4	5.0				
OUTFALL-10-20-21-1	8	1.0						o
OUTFALL-10-21-21-2			8.9	5.0				
OUTFALL-10-21-21-1	7	1.0						o
OUTFALL-10-22-21-2			10	5.0				
OUTFALL-10-22-21-1	7	1.0						o
OUTFALL-10-23-21-2			10	5.0				
OUTFALL-10-23-21-1	6	1.0						o
OUTFALL-10-24-21-2			9.4	5.0				
OUTFALL-10-24-21-1	6	1.0						o
OUTFALL-10-25-21-2			9.3	5.0				
OUTFALL-10-25-21-1	6	1.0						o
OUTFALL-10-26-21-2			10	5.0				
OUTFALL-10-26-21-1	6	1.0						o
OUTFALL-10-27-21-2			7.7	5.0				

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
OUTFALL-10-27-21-1	6	1.0						o
OUTFALL-10-28-21-2			8.2	5.0				
OUTFALL-10-28-21-1	7	1.0						o
OUTFALL-10-29-21-2			9.4	5.0				
OUTFALL-10-29-21-1	7	1.0						o
OUTFALL-10-30-21-2			8.6	5.0				
OUTFALL-10-30-21-1	7	1.0						o
OUTFALL-10-31-21-2			8.2	5.0				
OUTFALL-10-31-21-1	6	1.0						o
Red Pond-10-04-21-06:25-2					130	40		
Red Pond-10-04-21-06:25-1	390	10						o,d
Red Pond-10-11-21-07:20-1	400	20						o,d
Red Pond-10-12-21-07:15-2					150	20		
Red Pond-10-12-21-07:15-1	390	40						o,d
Red Pond-10-13-21-07:25-2					140	20		
Red Pond-10-13-21-07:25-1	390	40						o,d
Red Pond-10-14-21-07:25-1	360	40						o,d
Red Pond-10-14-21-07:25-2	360	40						o,d
Red Pond-10-15-21-08:00-2					140	40		
Red Pond-10-15-21-08:00-1	330	40						o,d
Red Pond-10-18-21-07:10-2					150	40		
Red Pond-10-18-21-07:10-1	430	40						o,d
Red Pond-10-19-21-07:05-2					130	20		
Red Pond-10-19-21-07:05-1	410	40						o,d
Red Pond-10-20-21-07:00-1	400	40						o,d
Red Pond-10-21-21-07:20-1	390	40						o
Red Pond-10-22-21-07:05-2					160	20		

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
Red Pond-10-22-21-07:05-1	350	40						o,d
Red Pond-10-25-21-07:15-2					130	20		
Red Pond-10-25-21-07:15-1	320	40						o,d
Red Pond-10-26-21-07:10-2					140	20		
Red Pond-10-26-21-07:10-1	260	40						o,d
Red Pond-10-27-21-05:50-2					41	20		
Red Pond-10-27-21-05:50-1	340	40						o,d
Red Pond-10-28-21-07:15-2					77	20		
Red Pond-10-28-21-07:15-1	320	40						o,d
Red Pond-10-29-21-07:15-2					84	20		
Red Pond-10-29-21-07:15-1	200	40						o,d



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Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321720

Data Transmittal Cover Page

Project Name: Pall Corporation
ATS Project Number: G001-002
ATS Report Number(s): Inorg_SRF_Oct_PO3225
Client PO Number: 4504963225

Project Description: This data report contains the results of 101 water samples, received by ATS during the months of October and November, to be analyzed for 1,4-Dioxane.

We certify that the sample analyses for this report have been conducted in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written Standard Operating Procedure specific to the ATS Laboratories, as required by USEPA. Laboratory data sheets, SOPs, and QA/QC information are available for inspection and audit at the laboratory upon request. Unless specifically noted on the data report, all applicable sample preservation and holding time requirements have been met.

Recipient: Mr. Gage Trendel **Email:** gtrendel@fv-operations.com
FAX Number: _____

No. of Pages (including cover pg.): 193

From: Sarah Stubblefield **Email:** Sarah.Stubblefield@AnnArborTechnicalServices.com
Senior Chemist / Lab Manager **FAX Number:** 734-995-3731

Additional Message: _____

Date: 11/5/21 **Signed:** 

IF YOU DO NOT RECEIVE ALL PAGES OF THIS TRANSMITTAL, PLEASE CALL 734-995-0995.

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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1021211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1021211

Client PO Number: 4504963225

Case Narrative Summary

This case narrative applies to the following 14 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/21/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/21/21</i>				
Outfall 001	10/20/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/21/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/21/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/21/21	Urgent	1,4-Dioxane	Water
BP-1	10/21/21	Urgent	1,4-Dioxane	Water
OF-Grab	10/21/21	Urgent	1,4-Dioxane	Water
OF-Test	10/21/21	Urgent	1,4-Dioxane	Water
Red Pond	10/21/21	Urgent	1,4-Dioxane	Water
MW-142 (155-160)	10/20/21	Urgent	1,4-Dioxane	Water
MW-142 (145-150)	10/20/21	Urgent	1,4-Dioxane	Water
MW-142 (170-180)	10/20/21	Urgent	1,4-Dioxane	Water
MW-142 (190-195')	10/20/21	Urgent	1,4-Dioxane	Water
MW-142 (200-205')	10/20/21	Urgent	1,4-Dioxane	Water
MW-142 (210-215')	10/20/21	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT

Number of Samples

- 14 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **The following samples were received un-preserved and analyzed at native pH.**
 - MW-142 (145-150”) 10/20/21

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP’s and project specifications. In addition, all data conform to the laboratory’s Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

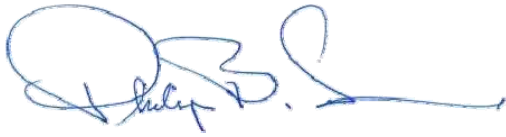
Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/21/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	Outfall 001	Analysis Date	10/21/2021
Laboratory Sample ID	Outfall 001 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	Comb Eff	Analysis Date	10/21/2021
Laboratory Sample ID	Comb Eff 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/21/2021
Laboratory Sample ID	Eff-OC-1A 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/21/2021
Laboratory Sample ID	Eff-OC-2A 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.010	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	BP-1	Analysis Date	10/21/2021
Laboratory Sample ID	BP-1 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	Outfall Grab	Analysis Date	10/21/2021
Laboratory Sample ID	Outfall Grab 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	Outfall Test	Analysis Date	10/21/2021
Laboratory Sample ID	Outfall Test 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	Red Pond	Analysis Date	10/21/2021
Laboratory Sample ID	Red Pond 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.39	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	MW-142 (155-160')	Analysis Date	10/21/2021
Laboratory Sample ID	MW-142 (155-160') 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	MW-142 (145-150')	Analysis Date	10/21/2021
Laboratory Sample ID	MW-142 (145-150') 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	MW-142 (175-180')	Analysis Date	10/21/2021
Laboratory Sample ID	MW-142 (175-180') 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	MW-142 (190-195')	Analysis Date	10/22/2021
Laboratory Sample ID	MW-142 (190-195') 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	MW-142 (200-205')	Analysis Date	10/22/2021
Laboratory Sample ID	MW-142 (200-205') 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1021211	Preparation Date	10/21/2021
Client Sample ID	MW-142 (210-215')	Analysis Date	10/22/2021
Laboratory Sample ID	MW-142 (210-215') 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1021211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1021211
SDG 1021211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/21/21	10/21/2021	10:52:02	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1021211
SDG 1021211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/21/21	10/21/2021	10:08:04	1,4-Dioxane	123-91-1		0.010	0.0098	mg/L	Wet	97.6	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1021211
SDG 1021211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102121 MS	10/21/2021	18:23:05	1,4-Dioxane	123-91-1	0.39	0.40	0.84	mg/L	Wet	112	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1021211
SDG 1021211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102121 MSD	10/21/2021	19:07:00	1,4-Dioxane	123-91-1	0.39	0.40	0.82	mg/L	Wet	107	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

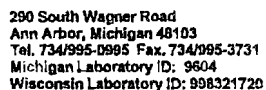
Method: USEPA 1624
QA/QC Batch Number: QCORG1021211
SDG 1021211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 102121 MS	10/21/2021	18:23:05	1,4-Dioxane	123-91-1	0.84		mg/L	Wet			
Red Pond 102121 MSD	10/21/2021	19:07:00	1,4-Dioxane	123-91-1	0.82	0.83	mg/L	Wet	2.0	20	

Comments

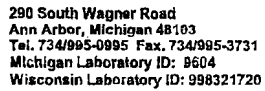
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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Page 1

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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1022211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1022211

Client PO Number: 4504963225

Case Narrative Summary

This case narrative applies to the following 14 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/22/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/22/21</i>				
Outfall 001	10/21/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/22/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/22/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/22/21	Urgent	1,4-Dioxane	Water
BP-1	10/22/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	10/22/21	Urgent	1,4-Dioxane	Water
Outfall-Test	10/22/21	Urgent	1,4-Dioxane	Water
Red Pond	10/22/21	Urgent	1,4-Dioxane	Water
TW-14	10/21/21	Standard	1,4-Dioxane	Water
TW-24	10/21/21	Standard	1,4-Dioxane	Water
TW-28	10/21/21	Standard	1,4-Dioxane	Water
TW-22	10/21/21	Standard	1,4-Dioxane	Water
TW-5	10/21/21	Standard	1,4-Dioxane	Water
TW-11	10/21/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 8 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
- 6 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the "Sample Receipt" section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- TW-24 10/21/21
- TW-28 10/21/21
- TW-5 10/21/21
- Red Pond 10/22/21
- TW-14 10/21/21
- TW-22 10/21/21
- TW-11 10/21/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	Outfall 001	Analysis Date	10/22/2021
Laboratory Sample ID	Outfall 001 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	Comb Eff	Analysis Date	10/22/2021
Laboratory Sample ID	Comb Eff 102221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/22/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/22/2021
Laboratory Sample ID	Eff-OC-1A 102221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/22/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/22/2021
Laboratory Sample ID	Eff-OC-2A 102221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/22/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.010	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	BP-1	Analysis Date	10/22/2021
Laboratory Sample ID	BP-1 102221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/22/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	Outfall Grab	Analysis Date	10/22/2021
Laboratory Sample ID	Outfall Grab 102221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/22/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	Outfall Test	Analysis Date	10/22/2021
Laboratory Sample ID	Outfall Test 102221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/22/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	Red Pond	Analysis Date	10/22/2021
Laboratory Sample ID	Red Pond 102221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/22/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.35	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	TW-14	Analysis Date	10/23/2021
Laboratory Sample ID	TW-14 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	2
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.11	0.002		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	TW-24	Analysis Date	10/23/2021
Laboratory Sample ID	TW-24 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	1.9	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	TW-28	Analysis Date	10/23/2021
Laboratory Sample ID	TW-28 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.49	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	TW-22	Analysis Date	10/23/2021
Laboratory Sample ID	TW-22 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.40	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	TW-5	Analysis Date	10/23/2021
Laboratory Sample ID	TW-5 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	20
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.63	0.02		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1022211	Preparation Date	10/22/2021
Client Sample ID	TW-11	Analysis Date	10/23/2021
Laboratory Sample ID	TW-11 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	5
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1022211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.16	0.005		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1022211
SDG 1022211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/22/21	10/22/2021	11:24:28	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1022211
SDG 1022211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/22/21	10/22/2021	12:22:45	1,4-Dioxane	123-91-1		0.010	0.011	mg/L	Wet	109	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1022211
SDG 1022211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102221 MS	10/22/2021	22:40:02	1,4-Dioxane	123-91-1	0.35	0.40	0.79	mg/L	Wet	109	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1022211
SDG 1022211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102221 MSD	10/22/2021	23:23:52	1,4-Dioxane	123-91-1	0.35	0.40	0.78	mg/L	Wet	106	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

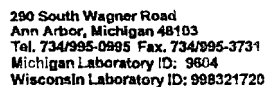
Method: USEPA 1624
QA/QC Batch Number: QCORG1022211
SDG 1022211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 102221 MS	10/22/2021	22:40:02	1,4-Dioxane	123-91-1	0.79		mg/L	Wet			
Red Pond 102221 MSD	10/22/2021	23:23:52	1,4-Dioxane	123-91-1	0.78	0.78	mg/L	Wet	1.2	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



Page 1

PROJECT ID / NUMBER Pall		LABORATORY INFORMATION PO#4504963225		SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (if applicable)															
SAMPLE CUSTODIAN (Print & Signature) Gage Trendel Gage_Trendel@Pall.com				Date		Fed Ex		UPS		DHL		Courier		Tracking Number					
				Date		Fed Ex		UPS		DHL		Courier		Tracking Number					
				Date		Fed Ex		UPS		DHL		Courier		Tracking Number					
				Date		Fed Ex		UPS		DHL		Courier		Tracking Number					
RELINQUISHED BY (Print & Signature) Gage Trendel		DATE / TIME 10/22/21		RECEIVED BY (Print & Signature) [Signature]		DATE / TIME		RELINQUISHED BY (Print & Signature)				DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME			
RELINQUISHED BY (Print & Signature) [Signature]		DATE / TIME 9:10		RECEIVED BY (Print & Signature)		DATE / TIME		RELINQUISHED BY (Print & Signature)				DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME			
COMMENTS (Preservation, etc.) Samples needed by 11/5 45 day hold time -> OK Outfall Eff's -> Unpreserved All others -> HCl preserved																			
ANALYSIS																			
MATRIX Indicate Soil/Water/Air Sediment/Sludge Extract																			
LINE NO.	BAR CODE	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	PRIORITY NUMBER											
1.	Outfall	10/21/21				Urgent	1												
2.	Combs off.	10/22/21	7:10																
3.	EFF-OC-1A	10/22/21	7:15																
4.	EFF-OC-2A	10/22/21	7:20																
5.	BP-1	10/22/21	7:25																
6.	Outfall-Grab	10/22/21	7:30																
7.	Outfall-Test	10/22/21	7:35																
8.	Real Pond	10/22/21	7:05																
9.	TW-14	10/21/21	10:15																
10.	TW-24	10/22/21	10:35																
11.	TW-24	10/22/21	10:30																
12.	TW-22	10/21/21	10:25																
13.	TW-5	10/24/21	13:30																
14.	TW-11	10/24/21	13:35																
15.																			
16.																			
17.																			
18.																			
19.																			
20.																			



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1025211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1025211

Client PO Number: 4504963225

Case Narrative Summary

This case narrative applies to the following 11 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/25/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/25/21</i>				
Outfall 001	10/22/21	Urgent	1,4-Dioxane	Water
Outfall 001	10/23/21	Urgent	1,4-Dioxane	Water
Outfall 001	10/24/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/25/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/25/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/25/21	Urgent	1,4-Dioxane	Water
BP-1	10/25/21	Urgent	1,4-Dioxane	Water
Grab OF	10/25/21	Urgent	1,4-Dioxane	Water
OF Test	10/25/21	Urgent	1,4-Dioxane	Water
Red Pond	10/25/21	Urgent	1,4-Dioxane	Water
TW-17	10/21/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 10 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
- 1 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None**

G001-002.21/CN_1025211.doc

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/25/21
- TW-17 10/21/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	Outfall 001	Analysis Date	10/25/2021
Laboratory Sample ID	Outfall 001 102221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/22/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	Outfall 001	Analysis Date	10/25/2021
Laboratory Sample ID	Outfall 001 102321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/23/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	Outfall 001	Analysis Date	10/25/2021
Laboratory Sample ID	Outfall 001 102421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/24/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	Comb Eff	Analysis Date	10/25/2021
Laboratory Sample ID	Comb Eff 102521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/25/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/25/2021
Laboratory Sample ID	Eff-OC-1A 102521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/25/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.004	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/25/2021
Laboratory Sample ID	Eff-OC-2A 102521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/25/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	BP-1	Analysis Date	10/25/2021
Laboratory Sample ID	BP-1 102521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/25/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	Outfall Grab	Analysis Date	10/25/2021
Laboratory Sample ID	Outfall Grab 102521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/25/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	Outfall Test	Analysis Date	10/25/2021
Laboratory Sample ID	Outfall Test 102521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/25/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	Red Pond	Analysis Date	10/25/2021
Laboratory Sample ID	Red Pond 102521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/25/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.33	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1025211	Preparation Date	10/25/2021
Client Sample ID	TW-17	Analysis Date	10/25/2021
Laboratory Sample ID	TW-17 102121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/21/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	5
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1025211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.077	0.005		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1025211
SDG 1025211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/25/21	10/25/2021	11:43:09	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1025211
SDG 1025211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/25/21	10/25/2021	10:59:19	1,4-Dioxane	123-91-1		0.010	0.011	mg/L	Wet	109	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1025211
SDG 1025211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102521 MS	10/25/2021	21:05:32	1,4-Dioxane	123-91-1	0.32	0.40	0.71	mg/L	Wet	97.7	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1025211
SDG 1025211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102521 MSD	10/25/2021	21:49:16	1,4-Dioxane	123-91-1	0.32	0.40	0.76	mg/L	Wet	110	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1025211
SDG 1025211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 102521 MS	10/25/2021	21:05:32	1,4-Dioxane	123-91-1	0.71		mg/L	Wet			
Red Pond 102521 MSD	10/25/2021	21:49:16	1,4-Dioxane	123-91-1	0.76	0.73	mg/L	Wet	6.5	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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Michigan Laboratory ID: 9804
Wisconsin Laboratory ID: 998321720

CHAIN OF CUSTODY RECORD

Page 1

PROJECT ID / NUMBER		LABORATORY INFORMATION		SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (if applicable)										
Fall		4504963225		Date	Fed Ex	UPS	DHL	Courier	Tracking Number					
SAMPLE CUSTODIAN (Print & Signature)				Date	Fed Ex	UPS	DHL	Courier	Tracking Number					
Gage Trendel Gage_Trendel@Fall.com				Date	Fed Ex	UPS	DHL	Courier	Tracking Number					
RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)		DATE / TIME				
Gage Trendel		10/25/21												
RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)		DATE / TIME				
Gage Trendel		9:50												
COMMENTS (Preservation, etc.)				ANALYSIS								MATRIX		
Samples needed by 11/5 45 day hold time -> OK				Outfall / EPPs -> unpreserved All others -> OK preserved								Indicate Soil/Water/Air Sediment/Sludge Extract		
LINE NO.	BAR CODE	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	PRIORITY NUMBER						
1.	Outfall	10/22/21		✓		Urgent	1							
2.	Outfall	10/23/21		✓			1							
3.	Outfall	10/24/21		✓	✓		1							
4.	Comb. EPP	10/25/21	7:20	✓	✓		1							
5.	EPP-OC-1A	10/25/21	7:25	✓	✓		1							
6.	EPP-OC-2A	10/25/21	7:25	✓	✓		1							
7.	TSP-1	10/25/21	7:30	✓	✓		1							
8.	GRW OF	10/25/21	7:35	✓	✓		1							
9.	OF Test	10/25/21	7:40	✓	✓		1							
10.	Red Pond	10/25/21	7:15	✓	✓		1							
11.	TW-n	10/24/21	10:30	✓	✓		1							
12.														
13.														
14.														
15.														
16.														
17.														
18.														
19.														
20.														



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1026211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1026211

Client PO Number: 4504963225

Case Narrative Summary

This case narrative applies to the following eight samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/26/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/26/21</i>				
Outfall 001	10/25/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/26/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/26/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/26/21	Urgent	1,4-Dioxane	Water
BP-1	10/26/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	10/26/21	Urgent	1,4-Dioxane	Water
Outfall-Test	10/26/21	Urgent	1,4-Dioxane	Water
Red Pond	10/26/21	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT

Number of Samples

- 8 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None**

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/26/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1026211	Preparation Date	10/26/2021
Client Sample ID	Outfall 001	Analysis Date	10/26/2021
Laboratory Sample ID	Outfall 001 102521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/25/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1026211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1026211	Preparation Date	10/26/2021
Client Sample ID	Comb Eff	Analysis Date	10/26/2021
Laboratory Sample ID	Comb Eff 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1026211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.001	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1026211	Preparation Date	10/26/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/26/2021
Laboratory Sample ID	Eff-OC-1A 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1026211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1026211	Preparation Date	10/26/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/26/2021
Laboratory Sample ID	Eff-OC-2A 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1026211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1026211	Preparation Date	10/26/2021
Client Sample ID	BP-1	Analysis Date	10/26/2021
Laboratory Sample ID	BP-1 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1026211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1026211	Preparation Date	10/26/2021
Client Sample ID	Outfall Grab	Analysis Date	10/26/2021
Laboratory Sample ID	Outfall Grab 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1026211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1026211	Preparation Date	10/26/2021
Client Sample ID	Outfall Test	Analysis Date	10/26/2021
Laboratory Sample ID	Outfall Test 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1026211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1026211	Preparation Date	10/26/2021
Client Sample ID	Red Pond	Analysis Date	10/26/2021
Laboratory Sample ID	Red Pond 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1026211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.0	0.0		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1026211
SDG 1026211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/26/21	10/26/2021	05:06:14	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1026211
SDG 1026211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/26/21	10/26/2021	04:22:35	1,4-Dioxane	123-91-1		0.010	0.011	mg/L	Wet	105	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1026211
SDG 1026211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 1026211 MS	10/26/2021	05:49:58	1,4-Dioxane	123-91-1		0.010	0.011	mg/L	Wet	108	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1026211
SDG 1026211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 1026211 MSD	10/26/2021	06:33:43	1,4-Dioxane	123-91-1		0.010	0.0098	mg/L	Wet	97.8	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

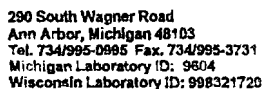
Method: USEPA 1624
QA/QC Batch Number: QCORG1026211
SDG 1026211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
ATS Tap Water 1026211 MS	10/26/2021	05:49:58	1,4-Dioxane	123-91-1	0.011		mg/L	Wet			
ATS Tap Water 1026211 MSD	10/26/2021	06:33:43	1,4-Dioxane	123-91-1	0.0098	0.010	mg/L	Wet	10	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



Page 1

PROJECT ID / NUMBER Pall						LABORATORY INFORMATION PO#4504963225						SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (if applicable)																															
SAMPLE CUSTODIAN (Print & Signature) Gage Trendel Gage-Trendel@Pall.com																								Date	Fed Ex	UPS	DHL	Courier	Tracking Number														
RELINQUISHED BY (Print & Signature) Gage Trendel												DATE / TIME 10/26/24		RECEIVED BY (Print & Signature)								DATE / TIME		RELINQUISHED BY (Print & Signature)						DATE / TIME		RECEIVED BY (Print & Signature)						DATE / TIME					
RELINQUISHED BY (Print & Signature) [Signature]												DATE / TIME 8:10		RECEIVED BY (Print & Signature) [Signature]								DATE / TIME		RELINQUISHED BY (Print & Signature)						DATE / TIME		RECEIVED BY (Print & Signature)						DATE / TIME					
COMMENTS (Preservation, etc.) 45 day hold time OK Samples needed in 24hrs												Unpreserved except... Red Panda Hel Aerosol																															
																								ANALYSIS																		MATRIX Indicate Soil/Water/Air Sediment/Sludge Extract	
LINE NO.	BAR CODE		DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION						NO. OF CONTAINERS	PRIORITY NUMBER																													
1.	Outfall		10/25/24		✓		Urgent						1		14-Digene																												
2.	EFF-comb		10/26/24	7:15	✓																																						
3.	EFF-CC-1A		10/26/24	7:20	✓																																						
4.	EFF-CC-2A		10/26/24	7:20	✓																																						
5.	BP-1		10/26/24	7:23	✓																																						
6.	Outfall-Gra		10/26/24	7:26	✓																																						
7.	Outfall - Test		10/26/24	7:35	✓																																						
8.	Red Panda		10/26/24	7:40	✓																																						
9.																																											
10.																																											
11.																																											
12.																																											
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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1027211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1027211

Client PO Number: 4504963225

Case Narrative Summary

This case narrative applies to the following 17 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/27/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/27/21</i>				
Outfall 001	10/26/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/27/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/27/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/27/21	Urgent	1,4-Dioxane	Water
BP-1	10/27/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	10/27/21	Urgent	1,4-Dioxane	Water
Outfall-Test	10/27/21	Urgent	1,4-Dioxane	Water
Red Pond	10/27/21	Urgent	1,4-Dioxane	Water
MW-143 (33-37)	10/26/21	Urgent	1,4-Dioxane	Water
MW-143 (41-45)	10/26/21	Urgent	1,4-Dioxane	Water
MW-143 (47-52)	10/26/21	Urgent	1,4-Dioxane	Water
MW-143 (57-62)	10/26/21	Urgent	1,4-Dioxane	Water
MW-143 (67-72)	10/26/21	Urgent	1,4-Dioxane	Water
MW-143 (77-82)	10/26/21	Urgent	1,4-Dioxane	Water
TW-20	10/26/21	Standard	1,4-Dioxane	Water
PW-1	10/26/21	Standard	1,4-Dioxane	Water
LB-1	10/26/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 14 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
- 3 Samples

G001-002.21/CN_1027211.doc

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **The following samples were received un-preserved and analyzed at native pH.**
 - MW-143 (33-37') 10/26/21
 - MW-143 (41-45') 10/26/21

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/27/21
- TW-20 10/26/21
- PW-1 10/26/21
- LB-1 10/26/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	Outfall 001	Analysis Date	10/27/2021
Laboratory Sample ID	Outfall 001 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	Comb Eff	Analysis Date	10/27/2021
Laboratory Sample ID	Comb Eff 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/27/2021
Laboratory Sample ID	Eff-OC-2A 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/27/2021
Laboratory Sample ID	Eff-OC-1A 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	BP-1	Analysis Date	10/27/2021
Laboratory Sample ID	BP-1 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	Outfall Grab	Analysis Date	10/27/2021
Laboratory Sample ID	Outfall Grab 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	Outfall Test	Analysis Date	10/27/2021
Laboratory Sample ID	Outfall Test 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	Red Pond	Analysis Date	10/27/2021
Laboratory Sample ID	Red Pond 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.34	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	MW-143 (33'-37')	Analysis Date	10/27/2021
Laboratory Sample ID	MW-143 (33'-37') 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	MW-143 (41'-45')	Analysis Date	10/27/2021
Laboratory Sample ID	MW-143 (41'-45') 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	MW-143 (47'-52')	Analysis Date	10/27/2021
Laboratory Sample ID	MW-143 (47'-52') 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	MW-143 (57'-62')	Analysis Date	10/27/2021
Laboratory Sample ID	MW-143 (57'-62') 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	MW-143 (67'-72')	Analysis Date	10/27/2021
Laboratory Sample ID	MW-143 (67'-72') 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	MW-143 (77'-82')	Analysis Date	10/27/2021
Laboratory Sample ID	MW-143 (77'-82') 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	TW-20	Analysis Date	10/28/2021
Laboratory Sample ID	TW-20 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.72	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	PW-1	Analysis Date	10/28/2021
Laboratory Sample ID	PW-1 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.64	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1027211	Preparation Date	10/27/2021
Client Sample ID	LB-1	Analysis Date	10/28/2021
Laboratory Sample ID	LB-1 102621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/26/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1027211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.29	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1027211
SDG 1027211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/27/21	10/27/2021	10:24:20	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1027211
SDG 1027211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/27/21	10/27/2021	09:40:23	1,4-Dioxane	123-91-1		0.010	0.0091	mg/L	Wet	91.4	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1027211
SDG 1027211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102721 MS	10/27/2021	22:58:47	1,4-Dioxane	123-91-1	0.34	0.40	0.76	mg/L	Wet	105	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1027211
SDG 1027211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102721 MSD	10/27/2021	23:42:38	1,4-Dioxane	123-91-1	0.34	0.40	0.80	mg/L	Wet	113	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1027211
SDG 1027211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 102721 MS	10/27/2021	22:58:47	1,4-Dioxane	123-91-1	0.76		mg/L	Wet			
Red Pond 102721 MSD	10/27/2021	23:42:38	1,4-Dioxane	123-91-1	0.80	0.78	mg/L	Wet	4.3	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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Wisconsin Laboratory ID: 998321720

CHAIN OF CUSTODY RECORD

Page 1

PROJECT ID / NUMBER		LABORATORY INFORMATION		SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (if applicable)																								
Pell		PO# 4504963225		Date	Fed Ex	UPS	DHL	Courier	Tracking Number																			
SAMPLE CUSTODIAN (Print & Signature)		Gage - Trendel		Date	Fed Ex	UPS	DHL	Courier	Tracking Number																			
Gage - Trendel		Gage - Trendel		Date	Fed Ex	UPS	DHL	Courier	Tracking Number																			
RELINQUISHED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME		RELINQUISHED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME														
Gage - Trendel		10/27/21																										
RELINQUISHED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME		RELINQUISHED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME														
Gage - Trendel		0825																										
COMMENTS (Preservation, etc.)																												
Sample needed by 11/5 45 day hold time -> OK Outfall Eff -> unpreserved all others -> HCl preserved																												
LINE NO.	BAR CODE	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION										NO. OF CONTAINERS	PRIORITY NUMBER	ANALYSIS										MATRIX Indicate Soil/Water/Air Sediment/Sludge Extract
1.	Outfall	10/26/21		✓		Urgent																						
2.	Camb - Eff	10/27/21	5:35		✓																							
3.	Eff - OC - 2A	10/27/21	6:00		✓																							
4.	Eff - OC - 1A	10/27/21	6:00		✓																							
5.	BP-1	10/27/21	6:05		✓																							
6.	Outfall - Grab	10/27/21	6:10		✓																							
7.	Outfall - Test	10/27/21	6:15		✓																							
8.	Red Pond	10/27/21	5:30		✓																							
9.	MW 143 (33-37)	10/26/21	10:00		✓	Urgent																						
10.	(41-45)	10/26/21	11:10		✓																							
11.	(47-52)	10/26/21	12:55		✓																							
12.	(57-62)	10/26/21	14:16		✓																							
13.	(67-72)	10/26/21	15:45		✓																							
14.	(77-82)	10/26/21	17:05		✓																							
15.	TU-20	10/26/21	10:45		✓																							
16.	PW-1	10/26/21	10:40		✓																							
17.	UB-1	10/26/21	10:50		✓																							
18.																												
19.																												
20.																												



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1028211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1028211

Client PO Number: 4504963225

Case Narrative Summary

This case narrative applies to the following 13 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/28/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/28/21</i>				
Outfall 001	10/27/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/28/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/28/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/28/21	Urgent	1,4-Dioxane	Water
BP-1	10/28/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	10/28/21	Urgent	1,4-Dioxane	Water
Outfall-Test	10/28/21	Urgent	1,4-Dioxane	Water
Red Pond	10/28/21	Urgent	1,4-Dioxane	Water
MW-143 (33-37)	10/27/21	Urgent	1,4-Dioxane	Water
MW-143 (41-45)	10/27/21	Urgent	1,4-Dioxane	Water
MW-143 (47-52)	10/27/21	Urgent	1,4-Dioxane	Water
MW-143 (57-62)	10/27/21	Urgent	1,4-Dioxane	Water
MW-143 (67-72)	10/27/21	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT

Number of Samples

- 13 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the "Sample Receipt" section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

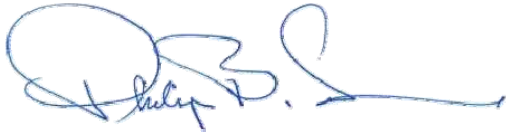
Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/28/21



_____/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



_____/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	Outfall 001	Analysis Date	10/28/2021
Laboratory Sample ID	Outfall 001 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	Comb Eff	Analysis Date	10/28/2021
Laboratory Sample ID	Comb Eff 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/28/2021
Laboratory Sample ID	Eff-OC-1A 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/28/2021
Laboratory Sample ID	Eff-OC-2A 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	BP-1	Analysis Date	10/28/2021
Laboratory Sample ID	BP-1 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	Outfall Grab	Analysis Date	10/28/2021
Laboratory Sample ID	Outfall Grab 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	Outfall Test	Analysis Date	10/28/2021
Laboratory Sample ID	Outfall Test 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	Red Pond	Analysis Date	10/28/2021
Laboratory Sample ID	Red Pond 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.32	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS

Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	MW-143 (87'-92')	Analysis Date	10/28/2021
Laboratory Sample ID	MW-143 (87'-92') 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	MW-143 (97'-102')	Analysis Date	10/28/2021
Laboratory Sample ID	MW-143 (97'-102') 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	MW-143 (107'-112')	Analysis Date	10/28/2021
Laboratory Sample ID	MW-143 (107'-112') 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	MW-143 (117'-122')	Analysis Date	10/28/2021
Laboratory Sample ID	MW-143 (117'-122') 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1028211	Preparation Date	10/28/2021
Client Sample ID	MW-143 (127'-132')	Analysis Date	10/28/2021
Laboratory Sample ID	MW-143 (127'-132') 102721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/27/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1028211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1028211
SDG 1028211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/28/21	10/28/2021	05:33:01	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1028211
SDG 1028211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/28/21	10/28/2021	04:49:10	1,4-Dioxane	123-91-1		0.010	0.011	mg/L	Wet	110	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1028211
SDG 1028211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102821 MS	10/28/2021	20:53:12	1,4-Dioxane	123-91-1	0.32	0.40	0.73	mg/L	Wet	102	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1028211
SDG 1028211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102821 MSD	10/28/2021	21:37:08	1,4-Dioxane	123-91-1	0.32	0.40	0.66	mg/L	Wet	87.0	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

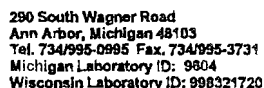
Method: USEPA 1624
QA/QC Batch Number: QCORG1028211
SDG 1028211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 102821 MS	10/28/2021	20:53:12	1,4-Dioxane	123-91-1	0.73		mg/L	Wet			
Red Pond 102821 MSD	10/28/2021	21:37:08	1,4-Dioxane	123-91-1	0.66	0.69	mg/L	Wet	8.8	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1029211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1029211

Client PO Number: 4504963225

Case Narrative Summary

This case narrative applies to the following 12 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/29/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/29/21</i>				
Outfall 001	10/28/21	Urgent	1,4-Dioxane	Water
Red Pond	10/29/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/29/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/29/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/29/21	Urgent	1,4-Dioxane	Water
BP-1	10/29/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	10/29/21	Urgent	1,4-Dioxane	Water
Outfall-Test	10/29/21	Urgent	1,4-Dioxane	Water
MW-143 (137-142')	10/28/21	Urgent	1,4-Dioxane	Water
MW-143 (157-162')	10/28/21	Urgent	1,4-Dioxane	Water
MW-143 (167-172')	10/28/21	Urgent	1,4-Dioxane	Water
TW-20	10/28/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 11 Samples
- 1 Sample

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the "Sample Receipt" section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **None**

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/29/21
- TW-14 10/28/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	Outfall 001	Analysis Date	10/29/2021
Laboratory Sample ID	Outfall 001 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	Red Pond	Analysis Date	10/29/2021
Laboratory Sample ID	Red Pond 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ED	ED		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	Comb Eff	Analysis Date	10/29/2021
Laboratory Sample ID	Comb Eff 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/29/2021
Laboratory Sample ID	Eff-OC-1A 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/29/2021
Laboratory Sample ID	Eff-OC-2A 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	BP-1	Analysis Date	10/29/2021
Laboratory Sample ID	BP-1 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	Outfall Grab	Analysis Date	10/29/2021
Laboratory Sample ID	Outfall Grab 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	Outfall Test	Analysis Date	10/29/2021
Laboratory Sample ID	Outfall Test 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	MW-143 (137'-142')	Analysis Date	10/29/2021
Laboratory Sample ID	MW-143 (137'-142') 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	MW-143 (157'-162')	Analysis Date	10/29/2021
Laboratory Sample ID	MW-143 (157'-162') 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	MW-143 (167'-172')	Analysis Date	10/29/2021
Laboratory Sample ID	MW-143 (167'-172') 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1029211	Preparation Date	10/29/2021
Client Sample ID	TW-14	Analysis Date	11/02/2021
Laboratory Sample ID	TW-14 102821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/28/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	4
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1029211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.11	0.004		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1029211
SDG 1029211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/29/21	10/29/2021	17:14:24	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1029211
SDG 1029211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 102921 MS	10/30/2021	02:44:27	1,4-Dioxane	123-91-1		0.010	0.0099	mg/L	Wet	99.2	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1029211
SDG 1029211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 102921 MSD	10/30/2021	03:28:14	1,4-Dioxane	123-91-1		0.010	0.0094	mg/L	Wet	93.7	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1029211
SDG 1029211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/29/21	10/29/2021	16:30:30	1,4-Dioxane	123-91-1		0.010	0.010	mg/L	Wet	103	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

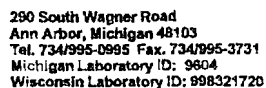
Method: USEPA 1624
QA/QC Batch Number: QCORG1029211
SDG 1029211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
ATS Tap Water 102921 MS	10/30/2021	02:44:27	1,4-Dioxane	123-91-1	0.0099		mg/L	Wet			
ATS Tap Water 102921 MSD	10/30/2021	03:28:14	1,4-Dioxane	123-91-1	0.0094	0.0096	mg/L	Wet	5.6	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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[illegible]

Sarah Stubblefield

From: Trendel, Gage <gage_trendel@pall.com>
Sent: Friday, October 29, 2021 9:26 AM
To: Sarah Stubblefield; Gage Trendel
Subject: RE: Sample Discrepancy

Yep. That's my bad.

Confidential - Company Proprietary

From: Sarah Stubblefield <Sarah.Stubblefield@annarbortechnicalservices.com>
Sent: Friday, October 29, 2021 9:25 AM
To: Trendel, Gage <gage_trendel@pall.com>; Gage Trendel <gtrendel@fv-operations.com>
Subject: Sample Discrepancy

Hi Gage.

Today's COC indicates a sample date of 10/29 for the three MW-143, but the labels say 10/28. Are you OK with us changing the COC to a date of 10/28 for these three samples?

-S-

Sarah Stubblefield | Senior Chemist / Laboratory Manager
Tel: 734.995.0995 | Fax: 734.995.3731 | Cell: 734.368.4730
Email: Sarah.Stubblefield@AnnArborTechnicalServices.com

Ann Arbor Technical Services, Inc.
290 South Wagner Road | Ann Arbor, Michigan 48103
Web: AnnArborTechnicalServices.com

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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1101211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1101211

Client PO Number: 4504963225

Case Narrative Summary

This case narrative applies to the following 12 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 11/01/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 11/01/21</i>				
Outfall 001	10/31/21	Urgent	1,4-Dioxane	Water
Comb Eff	11/1/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	11/1/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	11/1/21	Urgent	1,4-Dioxane	Water
BP-1	11/1/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	11/1/21	Urgent	1,4-Dioxane	Water
Outfall-Test	11/1/21	Urgent	1,4-Dioxane	Water
Outfall 001	10/30/21	Urgent	1,4-Dioxane	Water
Outfall 001	10/29/21	Urgent	1,4-Dioxane	Water
MW-121S	10/29/21	Standard	1,4-Dioxane	Water
MW-121d	10/29/21	Standard	1,4-Dioxane	Water
Red Pond	11/1/21	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 10 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
- 2 Sample

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the "Sample Receipt" section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

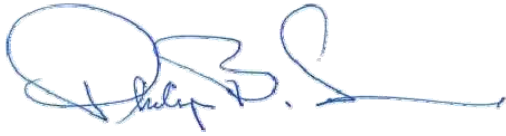
Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 11/1/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	Outfall 001	Analysis Date	11/01/2021
Laboratory Sample ID	Outfall 001 103121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/31/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	Comb Eff	Analysis Date	11/01/2021
Laboratory Sample ID	Comb Eff 110121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	11/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	Eff-OC-1A	Analysis Date	11/01/2021
Laboratory Sample ID	Eff-OC-1A 110121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	11/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	Eff-OC-2A	Analysis Date	11/01/2021
Laboratory Sample ID	Eff-OC-2A 110121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	11/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	BP-1	Analysis Date	11/01/2021
Laboratory Sample ID	BP-1 110121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	11/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	Outfall Grab	Analysis Date	11/01/2021
Laboratory Sample ID	Outfall Grab 110121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	11/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	Outfall Test	Analysis Date	11/01/2021
Laboratory Sample ID	Outfall Test 110121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	11/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	Outfall 001	Analysis Date	11/01/2021
Laboratory Sample ID	Outfall 001 103021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/30/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	Outfall 001	Analysis Date	11/01/2021
Laboratory Sample ID	Outfall 001 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	Red Pond	Analysis Date	11/01/2021
Laboratory Sample ID	Red Pond 110121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	11/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.30	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	MW-121s	Analysis Date	11/01/2021
Laboratory Sample ID	MW-121s 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1101211	Preparation Date	11/01/2021
Client Sample ID	MW-121D	Analysis Date	11/02/2021
Laboratory Sample ID	MW-121D 102921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/29/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1101211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1101211
SDG 1101211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 11/1/21	11/01/2021	11:22:46	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1101211
SDG 1101211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 11/1/21	11/01/2021	10:38:49	1,4-Dioxane	123-91-1		0.010	0.0098	mg/L	Wet	98.4	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1101211
SDG 1101211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 110121 MS	11/01/2021	22:17:23	1,4-Dioxane	123-91-1	0.30	0.40	0.73	mg/L	Wet	109	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1101211
SDG 1101211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 110121 MSD	11/01/2021	23:01:05	1,4-Dioxane	123-91-1	0.30	0.40	0.78	mg/L	Wet	120	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

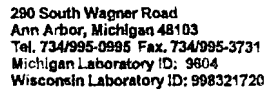
Method: USEPA 1624
QA/QC Batch Number: QCORG1101211
SDG 1101211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 110121 MS	11/01/2021	22:17:23	1,4-Dioxane	123-91-1	0.73		mg/L	Wet			
Red Pond 110121 MSD	11/01/2021	23:01:05	1,4-Dioxane	123-91-1	0.78	0.76	mg/L	Wet	6.2	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



Page 1

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Sarah Stubblefield

From: Trendel, Gage <gage_trendel@pall.com>
Sent: Tuesday, November 2, 2021 8:33 AM
To: Sarah Stubblefield
Subject: RE: Yesterday's samples

No problem. That's what I'd of asked for regardless.

Confidential - Company Proprietary

From: Sarah Stubblefield <Sarah.Stubblefield@annarbortechnicalservices.com>
Sent: Tuesday, November 2, 2021 8:24 AM
To: Trendel, Gage <gage_trendel@pall.com>
Subject: Yesterday's samples

Just a head's up. We received a Red Pond samples, but it wasn't on the COC...we ran it like normal with an urgent TAT.

Sorry, meant to confirm this with you yesterday, but my day got away from me.

-S-

Sarah Stubblefield | Senior Chemist / Laboratory Manager
Tel: 734.995.0995 | Fax: 734.995.3731 | Cell: 734.368.4730
Email: Sarah.Stubblefield@AnnArborTechnicalServices.com

Ann Arbor Technical Services, Inc.
290 South Wagner Road | Ann Arbor, Michigan 48103
Web: AnnArborTechnicalServices.com

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Ann Arbor, Michigan 48103
Tel. 734/995-0995 Fax. 734/995-3731
Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321720

Data Transmittal Cover Page

Project Name: Pall Corporation
ATS Project Number: G001-002
ATS Report Number(s): Inorg_SRF_Oct_PO9621
Client PO Number: 4504859621

Project Description: This data report contains the results of 182 water samples, received by ATS during the month of October, to be analyzed for 1,4-Dioxane.

We certify that the sample analyses for this report have been conducted in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written Standard Operating Procedure specific to the ATS Laboratories, as required by USEPA. Laboratory data sheets, SOPs, and QA/QC information are available for inspection and audit at the laboratory upon request. Unless specifically noted on the data report, all applicable sample preservation and holding time requirements have been met.

Recipient: Mr. Gage Trendel **Email:** gtrendel@fv-operations.com
FAX Number: _____

No. of Pages (including cover pg.): 350

From: Sarah Stubblefield **Email:** Sarah.Stubblefield@AnnArborTechnicalServices.com
Senior Chemist / Lab Manager **FAX Number:** 734-995-3731

Additional Message: _____

Date: 11/5/21 **Signed:** 

IF YOU DO NOT RECEIVE ALL PAGES OF THIS TRANSMITTAL, PLEASE CALL 734-995-0995.

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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1001211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1001211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following seven samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/1/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/1/21</i>				
Outfall	9/30/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/1/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/1/21	Urgent	1,4-Dioxane	Water
BP-1	10/1/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	10/1/21	Urgent	1,4-Dioxane	Water
Outfall-Test	10/1/21	Urgent	1,4-Dioxane	Water
Comb. Eff.	10/1/21	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT

Number of Samples

- 7 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions


Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- **None**



_____/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



_____/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1001211	Preparation Date	10/01/2021
Client Sample ID	Outfall 001	Analysis Date	10/01/2021
Laboratory Sample ID	Outfall 001 093021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	09/30/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1001211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1001211	Preparation Date	10/01/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/01/2021
Laboratory Sample ID	Eff-OC-2A 100121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1001211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1001211	Preparation Date	10/01/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/01/2021
Laboratory Sample ID	Eff-OC-1A 100121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1001211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1001211	Preparation Date	10/01/2021
Client Sample ID	BP-1	Analysis Date	10/01/2021
Laboratory Sample ID	BP-1 100121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1001211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.

Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1001211	Preparation Date	10/01/2021
Client Sample ID	Outfall Grab	Analysis Date	10/01/2021
Laboratory Sample ID	Outfall Grab 100121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1001211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1001211	Preparation Date	10/01/2021
Client Sample ID	Outfall Test	Analysis Date	10/01/2021
Laboratory Sample ID	Outfall Test 100121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1001211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1001211	Preparation Date	10/01/2021
Client Sample ID	Comb Eff	Analysis Date	10/01/2021
Laboratory Sample ID	Comb Eff 100121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1001211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1001211
SDG 1001211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/1/21	10/01/2021	10:21:55	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1001211
SDG 1001211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/1/21	10/01/2021	09:37:31	1,4-Dioxane	123-91-1		0.010	0.0093	mg/L	Wet	92.6	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1001211
SDG 1001211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
TW-14 091721 MS	10/01/2021	17:18:56	1,4-Dioxane	123-91-1	1.2	2.0	3.3	mg/L	Wet	106	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1001211
SDG 1001211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
TW-14 091721 MSD	10/01/2021	18:03:12	1,4-Dioxane	123-91-1	1.2	2.0	3.2	mg/L	Wet	102	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1001211
SDG 1001211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
TW-14 091721 MS	10/01/2021	17:18:56	1,4-Dioxane	123-91-1	3.3		mg/L	Wet			
TW-14 091721 MSD	10/01/2021	18:03:12	1,4-Dioxane	123-91-1	3.2	3.2	mg/L	Wet	1.9	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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Wisconsin Laboratory ID: 998321720

CHAIN OF CUSTODY RECORD

Page 1

PROJECT ID / NUMBER		LABORATORY INFORMATION		SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (if applicable)										
Pall		PO# 4504859621		Date	Fed Ex	UPS	DHL	Courier	Tracking Number					
SAMPLE CUSTODIAN (Print & Signature)		Gage Trendel Gage-Trendel@Pall.com		Date	Fed Ex	UPS	DHL	Courier	Tracking Number					
RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)		DATE / TIME				
Gage Trendel		10/11/21	Jim Bradley	10/11/21 9:30										
RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)		DATE / TIME				
[Signature]		9:05												
COMMENTS (Preservation, etc.)				ANALYSIS								MATRIX		
Samples needed w/ in 24 hours 45 day hold time -> OK												Indicate Soil/Water/Air Sediment/Sludge Extract		
LINE NO.	BAR CODE	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	PRIORITY NUMBER						
1.	Outfall	9/30/21	N/A			Urgent	1							
2.	Eff-OC-2A	10/11/21	7:20				1							
3.	Eff-OC-1A	10/11/21	7:28				1							
4.	BP-1	10/11/21	7:25				1							
5.	Outfall-Grab	10/11/21	7:30				1							
6.	Outfall-Test	10/11/21	7:35				1							
7.	Comb. Eff.	10/11/21	7:15				1							
8.														
9.														
10.														
11.														
12.														
13.														
14.														
15.														
16.														
17.														
18.														
19.														
20.														



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1004211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1004211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following eleven samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/4/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/1/21</i>				
Outfall	10/3/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/4/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/4/21	Urgent	1,4-Dioxane	Water
BP-1	10/4/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	10/4/21	Urgent	1,4-Dioxane	Water
Outfall-Test	10/4/21	Urgent	1,4-Dioxane	Water
Comb. Eff.	10/4/21	Urgent	1,4-Dioxane	Water
Red Pond	10/4/21	Urgent	1,4-Dioxane	Water
BP-1 #2	10/4/21	Urgent	1,4-Dioxane	Water
Outfall-Grab #2	10/4/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A #2	10/4/21	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT

Number of Samples

- 11 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- Red Pond 10/4/21 was received un-preserved and analyzed at native pH.**

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/4/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	Outfall 001	Analysis Date	10/04/2021
Laboratory Sample ID	Outfall 001 1003211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/03/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/04/2021
Laboratory Sample ID	Eff-OC-1A 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/04/2021
Laboratory Sample ID	Eff-OC-2A 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	BP-1	Analysis Date	10/04/2021
Laboratory Sample ID	BP-1 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	Outfall Grab	Analysis Date	10/04/2021
Laboratory Sample ID	Outfall Grab 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	Outfall Test	Analysis Date	10/04/2021
Laboratory Sample ID	Outfall Test 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	Comb Eff	Analysis Date	10/04/2021
Laboratory Sample ID	Comb Eff 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	Red Pond	Analysis Date	10/04/2021
Laboratory Sample ID	Red Pond 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.39	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	BP-1 #2	Analysis Date	10/05/2021
Laboratory Sample ID	BP-1 #2 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	Outfall Grab #2	Analysis Date	10/05/2021
Laboratory Sample ID	Outfall Grab #2 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1004211	Preparation Date	10/04/2021
Client Sample ID	Eff-OC-2A #2	Analysis Date	10/05/2021
Laboratory Sample ID	Eff-OC-2A #2 1004211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1004211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1004211
SDG 1004211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/4/21	10/04/2021	18:03:02	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1004211
SDG 1004211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/4/21	10/04/2021	17:18:42	1,4-Dioxane	123-91-1		0.010	0.010	mg/L	Wet	99.8	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1004211
SDG: 1004211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 1004211 MS	10/05/2021	02:55:50	1,4-Dioxane	123-91-1		0.010	0.011	mg/L	Wet	108	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1004211
SDG 1004211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 1004211 MSD	10/05/2021	03:40:15	1,4-Dioxane	123-91-1		0.010	0.011	mg/L	Wet	112	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

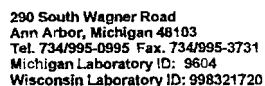
Method: USEPA 1624
QA/QC Batch Number: QCORG1004211
SDG 1004211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
ATS Tap Water 1004211 MS	10/05/2021	02:55:50	1,4-Dioxane	123-91-1	0.011		mg/L	Wet			
ATS Tap Water 1004211 MSD	10/05/2021	03:40:15	1,4-Dioxane	123-91-1	0.011	0.011	mg/L	Wet	3.5	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1005211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1005211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following seven samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/5/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/5/21</i>				
Outfall 001	10/4/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/5/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/5/21	Urgent	1,4-Dioxane	Water
BP-1	10/5/21	Urgent	1,4-Dioxane	Water
Outfall Grab	10/5/21	Urgent	1,4-Dioxane	Water
Outfall Test	10/5/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/5/21	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT

Number of Samples

- 7 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None
-

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- None

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions


Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- **None**



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1005211	Preparation Date	10/05/2021
Client Sample ID	Outfall 001	Analysis Date	10/05/2021
Laboratory Sample ID	Outfall 001 100421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1005211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1005211	Preparation Date	10/05/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/05/2021
Laboratory Sample ID	Eff-OC-1A 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1005211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1005211	Preparation Date	10/05/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/05/2021
Laboratory Sample ID	Eff-OC-2A 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1005211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1005211	Preparation Date	10/05/2021
Client Sample ID	BP-1	Analysis Date	10/05/2021
Laboratory Sample ID	BP-1 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1005211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1005211	Preparation Date	10/05/2021
Client Sample ID	Outfall Grab	Analysis Date	10/05/2021
Laboratory Sample ID	Outfall Grab 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1005211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1005211	Preparation Date	10/05/2021
Client Sample ID	Outfall Test	Analysis Date	10/05/2021
Laboratory Sample ID	Outfall Test 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1005211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1005211	Preparation Date	10/05/2021
Client Sample ID	Comb Eff	Analysis Date	10/05/2021
Laboratory Sample ID	Comb Eff 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1005211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1005211
SDG 1005211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/5/21	10/05/2021	09:39:19	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

7 ca a Ybip
C#A ^o@ a•A^y^} &^NUAUC# ^o@ a•A} |••A c@!, a^A[c^aE
Oa& |aa} •A^+! { ^aA i: A A } aa *E
U[b&a] ^8aa^ [i: q * A q aT OSaa^aA [] A[, ^o&aa: aa} A aa aasâE
T A Qaaæ • A | çæ^aA [i: q * A q aaæ^aA [] A aq] | ^a q } E



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1005211
SDG 1005211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/5/21	10/05/2021	08:54:59	1,4-Dioxane	123-91-1		0.010	0.011	mg/L	Wet	108	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1005211
SDG 1005211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 1005211 MS	10/05/2021	19:03:43	1,4-Dioxane	123-91-1		0.0050	0.0054	mg/L	Wet	108	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1005211
SDG 1005211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 1005211 MSD	10/05/2021	19:47:57	1,4-Dioxane	123-91-1		0.0050	0.0054	mg/L	Wet	107	80	120	

Comments

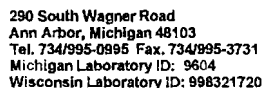
All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.

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Page 1

PROJECT ID / NUMBER Pall						LABORATORY INFORMATION F0#450489621								SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (If applicable)																																																																																											
SAMPLE CUSTODIAN (Print & Signature) Gage Trendel Gage_Trendel@Pall.com														Date		Fed Ex		UPS		DHL		Courier		Tracking Number																																																																																	
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RELINQUISHED BY (Print & Signature) Gage Trendel						DATE / TIME 10/5/21				RECEIVED BY (Print & Signature)								DATE / TIME				RELINQUISHED BY (Print & Signature)					DATE / TIME				RECEIVED BY (Print & Signature)					DATE / TIME																																																																					
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COMMENTS (Preservation, etc.) Samples needed in 24 hrs. 45 day hold time -> OK						No preservative																																																																																																			
ANALYSIS																						MATRIX Indicate Sol/Water/Air Sediment/Sludge Extract																																																																																			
LINE NO.																						BAR CODE																						DATE		TIME		COMP.		GRAB		SAMPLE IDENTIFICATION																		NO OF CONTAINERS		PRIORITY NUMBER		14-Dioxane																															
1.																						Outfall II																						10/4/21		N/A		✓				Urgent																		1																																			
2.																						Eff-OC-1A																						10/5/21		7:15				✓																				1																																			
3.																						Eff-OC-2A																						10/5/21		7:15				✓																				1																																			
4.																						BP-1																						10/5/21		7:20				✓																				1																																			
5.																						Outfall-Grab																						10/5/21		7:25				✓																				1																																			
6.																						Outfall-Test																						10/5/21		7:30				✓																				1																																			
7.																						Comb.-Eff.																						10/5/21		7:10				✓																				1																																			
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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1006211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1006211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following 23 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/6/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/6/21</i>				
Outfall 001	10/5/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/6/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/6/21	Urgent	1,4-Dioxane	Water
BP-1	10/6/21	Urgent	1,4-Dioxane	Water
Outfall Grab	10/6/21	Urgent	1,4-Dioxane	Water
Outfall Test	10/6/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/6/21	Urgent	1,4-Dioxane	Water
4141 Jackson Road	9/15/21	Urgent	1,4-Dioxane	Water
TW-22	10/1/21	Standard	1,4-Dioxane	Water
TW-29	10/1/21	Urgent	1,4-Dioxane	Water
TW-17	10/5/21	Standard	1,4-Dioxane	Water
TW-24	10/5/21	Standard	1,4-Dioxane	Water
TW-11	10/5/21	Standard	1,4-Dioxane	Water
TW-14	10/5/21	Standard	1,4-Dioxane	Water
TW-5	10/5/21	Standard	1,4-Dioxane	Water
MW-53d	10/4/21	Standard	1,4-Dioxane	Water
MW-53s	10/4/21	Standard	1,4-Dioxane	Water
MW-53I	10/4/21	Standard	1,4-Dioxane	Water
A2 Cleaning Supply	10/4/21	Standard	1,4-Dioxane	Water
MW-84s	10/4/21	Standard	1,4-Dioxane	Water
MW-103s	10/5/21	Standard	1,4-Dioxane	Water
MW-112I	10/5/21	Standard	1,4-Dioxane	Water
MW-112s	10/5/21	Standard	1,4-Dioxane	Water

G001-002.21/CN_1006211.doc

Upon receipt samples were scheduled for the following analyses.

<u>Analysis</u>	<u>Number of Samples</u>
• 1,4-Dioxane (USEPA 1624) – Urgent TAT	• 9 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
• 1,4-Dioxane (USEPA 1624) – Standard TAT	• 14 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **None**

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP’s and project specifications. In addition, all data conform to the laboratory’s Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

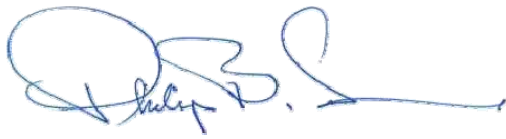
Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- TW-22 10/1/21
- TW-17 10/5/21
- TW-24 10/5/21
- TW-11 10/5/21
- TW-14 10/5/21
- TW-5 10/5/21
- MW-84s 10/4/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	Outfall 001	Analysis Date	10/06/2021
Laboratory Sample ID	Outfall 001 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/06/2021
Laboratory Sample ID	Eff-OC-1A 100621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/06/2021
Laboratory Sample ID	Eff-OC-2A 100621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	BP-1	Analysis Date	10/06/2021
Laboratory Sample ID	BP-1 100621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	Outfall Grab	Analysis Date	10/06/2021
Laboratory Sample ID	Outfall Grab 100621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	Outfall Test	Analysis Date	10/06/2021
Laboratory Sample ID	Outfall Test 100621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	Comb Eff	Analysis Date	10/06/2021
Laboratory Sample ID	Comb Eff 100621	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	4141 Jackson Road	Analysis Date	10/06/2021
Laboratory Sample ID	4141 Jackson Road 91521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	09/15/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.002	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	TW-29	Analysis Date	10/06/2021
Laboratory Sample ID	TW-29 100121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	20
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.45	0.02		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	MW-103S	Analysis Date	10/10/2021
Laboratory Sample ID	MW-103S 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.082	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	MW-112I	Analysis Date	10/10/2021
Laboratory Sample ID	MW-112I 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.009	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006211	Preparation Date	10/06/2021
Client Sample ID	MW-112S	Analysis Date	10/10/2021
Laboratory Sample ID	MW-112S 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.003	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	TW-22	Analysis Date	10/28/2021
Laboratory Sample ID	TW-22 100121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/01/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.45	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	TW-17	Analysis Date	10/28/2021
Laboratory Sample ID	TW-17 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.10	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	TW-24	Analysis Date	10/28/2021
Laboratory Sample ID	TW-24 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	1.9	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	TW-11	Analysis Date	10/28/2021
Laboratory Sample ID	TW-11 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.16	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	TW-14	Analysis Date	10/29/2021
Laboratory Sample ID	TW-14 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.10	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	TW-5	Analysis Date	10/28/2021
Laboratory Sample ID	TW-5 100521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/05/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	20
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.61	0.02		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	MW-53D	Analysis Date	10/23/2021
Laboratory Sample ID	MW-53D 100421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	MW-53S	Analysis Date	10/23/2021
Laboratory Sample ID	MW-53S 100421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	MW-53I	Analysis Date	10/23/2021
Laboratory Sample ID	MW-53I 100421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.038	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	A2 Cleaning Supply	Analysis Date	10/09/2021
Laboratory Sample ID	A2 Cleaning Supply 100421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.051	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1006212	Preparation Date	10/06/2021
Client Sample ID	MW-84S	Analysis Date	10/28/2021
Laboratory Sample ID	MW-84S 100421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/04/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1006212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.50	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1006211
SDG 1006211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/6/21	10/06/2021	12:26:33	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1006212
SDG 1006212
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-2 10/6/21	10/23/2021	05:57:36	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1006211
SDG 1006211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/6/21	10/06/2021	11:42:10	1,4-Dioxane	123-91-1		0.010	0.010	mg/L	Wet	102	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1006211
SDG 1006211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
TW-29 100121 MS	10/06/2021	15:28:12	1,4-Dioxane	123-91-1	0.45	0.40	0.82	mg/L	Wet	92.9	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1006211
SDG 1006211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
TW-29 100121 MSD	10/06/2021	16:24:03	1,4-Dioxane	123-91-1	0.45	0.40	0.78	mg/L	Wet	83.8	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1006212
SDG 1006212
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-2 10/6/21	10/23/2021	05:13:48	1,4-Dioxane	123-91-1		0.010	0.010	mg/L	Wet	104	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1006212
SDG 1006212
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
TW-14 100521 MS	10/29/2021	03:27:57	1,4-Dioxane	123-91-1	0.10	0.10	0.21	mg/L	Wet	105	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1006212
SDG 1006212
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
TW-14 100521 MSD	10/29/2021	04:11:52	1,4-Dioxane	123-91-1	0.10	0.10	0.19	mg/L	Wet	91.5	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1006211
SDG 1006211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
TW-29 100121 MS	10/06/2021	15:28:12	1,4-Dioxane	123-91-1	0.82		mg/L	Wet			
TW-29 100121 MSD	10/06/2021	16:24:03	1,4-Dioxane	123-91-1	0.78	0.80	mg/L	Wet	4.5	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

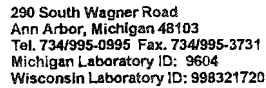
Method: USEPA 1624
QA/QC Batch Number: QCORG1006212
SDG 1006212
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
TW-14 100521 MS	10/29/2021	03:27:57	1,4-Dioxane	123-91-1	0.21		mg/L	Wet			
TW-14 100521 MSD	10/29/2021	04:11:52	1,4-Dioxane	123-91-1	0.19	0.20	mg/L	Wet	6.9	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



Page 1

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290 South Wagner Road
Ann Arbor, Michigan 48103
Tel. 734/995-0995 Fax. 734/995-3731
Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321720

CHAIN OF CUSTODY RECORD

Page 1

PROJECT ID / NUMBER		LABORATORY INFORMATION				SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (if applicable)											
SAMPLE CUSTODIAN (Print & Signature)		RECEIVED BY (Print & Signature)				TRACKING NUMBER											
RELINQUISHED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		TRACKING NUMBER											
RELINQUISHED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		TRACKING NUMBER											
COMMENTS (Preservation, etc.)		DATE / TIME		RECEIVED BY (Print & Signature)		TRACKING NUMBER											
1. MW-103S		10/5/21 1544															
2. MW-112I		10/5/21 1145															
3. MW-112S		10/5/21 1036															
4.																	
5.																	
6.																	
7.																	
8.																	
9.																	
10.																	
11.																	
12.																	
13.																	
14.																	
15.																	
16.																	
17.																	
18.																	
19.																	
20.																	

Sarah Stubblefield

From: Trendel, Gage <gage_trendel@pall.com>
Sent: Thursday, October 28, 2021 9:45 AM
To: Sarah Stubblefield; Gage Trendel
Subject: RE: Sample ID Help

Checked our in house COC, and it should actually be TW-17. Not TW-18.

Confidential - Company Proprietary

From: Sarah Stubblefield <Sarah.Stubblefield@annarbortechnicalservices.com>
Sent: Thursday, October 28, 2021 8:44 AM
To: Trendel, Gage <gage_trendel@pall.com>; Gage Trendel <gtrendel@fv-operations.com>
Subject: Sample ID Help

Hi Gage.

Can you help me out? We received a vial (see attached photo) that based on date, time, and process of elimination seem to line up with TW-18 on the COC (also attached). The label is a bit difficult to read, can you confirm that this sample is indeed TW-18 and not TW-17?

Thanks.

-S-

Sarah Stubblefield | Senior Chemist / Laboratory Manager
Tel: 734.995.0995 | Fax: 734.995.3731 | Cell: 734.368.4730
Email: Sarah.Stubblefield@AnnArborTechnicalServices.com

Ann Arbor Technical Services, Inc.
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UNIVERSITY OF

750-179

Date 10/5/21

Preservative

Hydrochloric Acid 1:1

Time 09:20

7647-01-0

Composite

ANALYST



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1009211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1007211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following 12 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/7/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/7/21</i>				
Outfall 001	10/6/21	Urgent	1,4-Dioxane	Water
Comb Effluent	10/7/21	Urgent	1,4-Dioxane	Water
OC-1A Effluent	10/7/21	Urgent	1,4-Dioxane	Water
OC-2A Effluent	10/7/21	Urgent	1,4-Dioxane	Water
BP-1	10/7/21	Urgent	1,4-Dioxane	Water
Outfall Grab	10/7/21	Urgent	1,4-Dioxane	Water
Outfall Test	10/7/21	Urgent	1,4-Dioxane	Water
A3	10/6/21	Urgent	1,4-Dioxane	Water
MW-110	10/6/21	Standard	1,4-Dioxane	Water
MW-104	10/6/21	Standard	1,4-Dioxane	Water
MW-76S	10/6/21	Standard	1,4-Dioxane	Water
MW-76i	10/6/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 8 Samples
- 4 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the "Sample Receipt" section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None
-

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

Lab Sample ID	Constituent	Percent Difference	Acceptance Limits
ATS Tap Water 1007211 MS/MSD	1,4-Dioxane	23	<20%

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- MW-110 10/6/21
- MW-76i 10/6/21
- MW-76s 10/6/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	Outfall 001	Analysis Date	10/07/2021
Laboratory Sample ID	Outfall 001 1006211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	Comb Eff	Analysis Date	10/07/2021
Laboratory Sample ID	Comb Eff 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/07/2021
Laboratory Sample ID	Eff-OC-1A 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/07/2021
Laboratory Sample ID	Eff-OC-2A 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	BP-1	Analysis Date	10/07/2021
Laboratory Sample ID	BP-1 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	Outfall Grab	Analysis Date	10/07/2021
Laboratory Sample ID	Outfall Grab 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	Outfall Test	Analysis Date	10/07/2021
Laboratory Sample ID	Outfall Test 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	A3	Analysis Date	10/07/2021
Laboratory Sample ID	A3 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	MW-110	Analysis Date	10/10/2021
Laboratory Sample ID	MW-110 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.12	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	MW-104	Analysis Date	10/10/2021
Laboratory Sample ID	MW-104 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.026	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	MW-76S	Analysis Date	10/23/2021
Laboratory Sample ID	MW-76S 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.27	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1007211	Preparation Date	10/07/2021
Client Sample ID	MW-76I	Analysis Date	10/10/2021
Laboratory Sample ID	MW-76I 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/06/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG10072221	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.10	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/7/21	10/07/2021	10:35:40	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/7/21	10/07/2021	09:51:21	1,4-Dioxane	123-91-1		0.010	0.010	mg/L	Wet	104	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 1007211 MS	10/07/2021	19:28:35	1,4-Dioxane	123-91-1		0.010	0.012	mg/L	Wet	118	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 1007211 MSD	10/07/2021	20:12:57	1,4-Dioxane	123-91-1		0.010	0.0094	mg/L	Wet	93.9	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
MW-76I 1007211 MS	10/10/2021	04:53:30	1,4-Dioxane	123-91-1	0.10	0.20	0.29	mg/L	Wet	94.1	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
MW-76I 1007211 MSD	10/10/2021	05:37:47	1,4-Dioxane	123-91-1	0.10	0.20	0.29	mg/L	Wet	95.3	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
ATS Tap Water 1007211 MS	10/07/2021	19:28:35	1,4-Dioxane	123-91-1	0.012		mg/L	Wet			
ATS Tap Water 1007211 MSD	10/07/2021	20:12:57	1,4-Dioxane	123-91-1	0.0094	0.011	mg/L	Wet	23	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

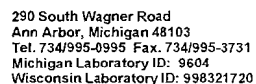
Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
MW-76l 1007211 MS	10/10/2021	04:53:30	1,4-Dioxane	123-91-1	0.29		mg/L	Wet			
MW-76l 1007211 MSD	10/10/2021	05:37:47	1,4-Dioxane	123-91-1	0.29	0.29	mg/L	Wet	0.82	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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[illegible]



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1008211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1008211

Client PO Number:

Case Narrative Summary

This case narrative applies to the following 11 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/8/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/8/21</i>				
Outfall 001	10/7/21	Urgent	1,4-Dioxane	Water
OC-1A Eff	10/8/21	Urgent	1,4-Dioxane	Water
OC-2A Eff	10/8/21	Urgent	1,4-Dioxane	Water
BP-1	10/8/21	Urgent	1,4-Dioxane	Water
Grab	10/8/21	Urgent	1,4-Dioxane	Water
Outfall Test	10/8/21	Urgent	1,4-Dioxane	Water
Comb Effluent	10/8/21	Urgent	1,4-Dioxane	Water
MW-11d	10/7/21	Standard	1,4-Dioxane	Water
MW-4d	10/7/21	Standard	1,4-Dioxane	Water
MW-35	10/7/21	Standard	1,4-Dioxane	Water
MW-66	10/7/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 7 Samples
- 4 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None**

G001-002.21/CN_1008211.doc

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- MW-11d 10/7/21
- MW-4d 10/7/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	Outfall 001	Analysis Date	10/08/2021
Laboratory Sample ID	Outfall 001 1007211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/08/2021
Laboratory Sample ID	Eff-OC-1A 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/08/2021
Laboratory Sample ID	Eff-OC-2A 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	BP-1	Analysis Date	10/08/2021
Laboratory Sample ID	BP-1 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	Outfall Grab	Analysis Date	10/08/2021
Laboratory Sample ID	Outfall Grab 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	Outfall Test	Analysis Date	10/08/2021
Laboratory Sample ID	Outfall Test 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	Comb Effluent	Analysis Date	10/09/2021
Laboratory Sample ID	Comb Effluent 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	MW-11D	Analysis Date	10/09/2021
Laboratory Sample ID	MW-11D 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.26	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	MW-4D	Analysis Date	10/09/2021
Laboratory Sample ID	MW-4D 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.34	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	MW-35	Analysis Date	10/09/2021
Laboratory Sample ID	MW-35 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.002	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1008211	Preparation Date	10/08/2021
Client Sample ID	MW-66	Analysis Date	10/09/2021
Laboratory Sample ID	MW-66 1008211	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/07/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1008211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.002	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1008211
SDG 1008211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/8/21	10/08/2021	11:22:53	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1008211
SDG 1008211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/8/21	10/08/2021	10:38:32	1,4-Dioxane	123-91-1		0.010	0.0092	mg/L	Wet	92.2	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
MW-76I 1007211 MS	10/10/2021	04:53:30	1,4-Dioxane	123-91-1	0.10	0.20	0.29	mg/L	Wet	94.1	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
MW-76I 1007211 MSD	10/10/2021	05:37:47	1,4-Dioxane	123-91-1	0.10	0.20	0.29	mg/L	Wet	95.3	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

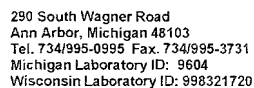
Method: USEPA 1624
QA/QC Batch Number: QCORG10072221
SDG 1007211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
MW-76l 1007211 MS	10/10/2021	04:53:30	1,4-Dioxane	123-91-1	0.29		mg/L	Wet			
MW-76l 1007211 MSD	10/10/2021	05:37:47	1,4-Dioxane	123-91-1	0.29	0.29	mg/L	Wet	0.82	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1011211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1011211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following 12 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/11/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/11/21</i>				
Outfall	10/10/21	Urgent	1,4-Dioxane	Water
Comb-Eff	10/11/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/11/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/11/21	Urgent	1,4-Dioxane	Water
BP-1	10/11/21	Urgent	1,4-Dioxane	Water
Outfall Grab	10/11/21	Urgent	1,4-Dioxane	Water
Outfall Test	10/11/21	Urgent	1,4-Dioxane	Water
Red Pond	10/11/21	Urgent	1,4-Dioxane	Water
MW-38d	10/8/21	Standard	1,4-Dioxane	Water
MW-38s	10/8/21	Standard	1,4-Dioxane	Water
MW-34s	10/8/21	Standard	1,4-Dioxane	Water
MW-34d	10/8/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 8 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
- 4 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **None**

G001-002.21/CN_1011211.doc

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- None

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- One MS/ MSD was not reportable due to inadequate spiking levels relative to native sample concentrations.

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/11/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	Outfall 001	Analysis Date	10/11/2021
Laboratory Sample ID	Outfall 001 101021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/10/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	Comb Effluent	Analysis Date	10/11/2021
Laboratory Sample ID	Comb Effluent 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/11/2021
Laboratory Sample ID	Eff-OC-1A 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/11/2021
Laboratory Sample ID	Eff-OC-2A 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	BP-1	Analysis Date	10/11/2021
Laboratory Sample ID	BP-1 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	Outfall Grab	Analysis Date	10/11/2021
Laboratory Sample ID	Outfall Grab 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	Outfall Test	Analysis Date	10/11/2021
Laboratory Sample ID	Outfall Test 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	Red Pond	Analysis Date	10/11/2021
Laboratory Sample ID	Red Pond 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	20
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.40	0.02		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	MW-38D	Analysis Date	10/18/2021
Laboratory Sample ID	MW-38D 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.041	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	MW-38S	Analysis Date	10/18/2021
Laboratory Sample ID	MW-38S 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	MW-34S	Analysis Date	10/19/2021
Laboratory Sample ID	MW-34S 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1011211	Preparation Date	10/11/2021
Client Sample ID	MW-34D	Analysis Date	10/19/2021
Laboratory Sample ID	MW-34D 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/08/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1011211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1011211
SDG 1011211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/11/21	10/11/2021	16:37:07	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

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ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1011211
SDG 1011211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/11/21	10/11/2021	15:52:46	1,4-Dioxane	123-91-1		0.010	0.0094	mg/L	Wet	94.2	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1011211
SDG 1011211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101121 MS	10/11/2021	23:16:45	1,4-Dioxane	123-91-1	0.40	0.20	NR	mg/L	Wet	nc	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.

NR - Not Reportable due to inadequate spiking levels relative to native sample concentrations.

nc - not calculated.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1011211
SDG 1011211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101121 MSD	10/12/2021	00:01:09	1,4-Dioxane	123-91-1	0.40	0.20	NR	mg/L	Wet	nc	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.

NR - Not Reportable due to inadequate spiking levels relative to native sample concentrations.

nc - not calculated.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

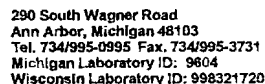
LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1011211
SDG 1011211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 101121 MS	10/11/2021	23:16:45	1,4-Dioxane	123-91-1	0.57		mg/L	Wet			
Red Pond 101121 MSD	10/12/2021	00:01:09	1,4-Dioxane	123-91-1	0.52	0.54	mg/L	Wet	10	20	

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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1012211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1012211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following 12 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/12/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/12/21</i>				
Outfall 001	10/11/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/12/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/12/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/12/21	Urgent	1,4-Dioxane	Water
BP-1	10/12/21	Urgent	1,4-Dioxane	Water
Outfall Grab	10/12/21	Urgent	1,4-Dioxane	Water
Outfall Test	10/12/21	Urgent	1,4-Dioxane	Water
Red Pond	10/12/21	Urgent	1,4-Dioxane	Water
MW-22	10/11/21	Standard	1,4-Dioxane	Water
MW-18d	10/11/21	Standard	1,4-Dioxane	Water
MW-64	10/11/21	Standard	1,4-Dioxane	Water
MW-32	10/11/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 8 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
- 4 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **None**

G001-002.21/CN_1012211.doc

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- None

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

Lab Sample ID	Constituent	Percent Recovery	Acceptance Limits
Red Pond 10/12/21 MS	1,4-Dioxane	76.7	80-120%

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

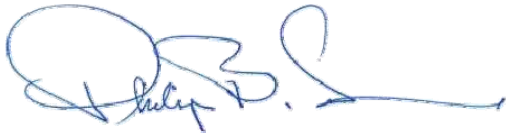
Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- MW-22 10/11/21
- Red Pond 10/12/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	Outfall 001	Analysis Date	10/12/2021
Laboratory Sample ID	Outfall 001 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	Comb Eff	Analysis Date	10/12/2021
Laboratory Sample ID	Comb Eff 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/12/2021
Laboratory Sample ID	Eff-OC-1A 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/12/2021
Laboratory Sample ID	Eff-OC-2A 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	BP-1	Analysis Date	10/12/2021
Laboratory Sample ID	BP-1 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	Outfall Grab	Analysis Date	10/12/2021
Laboratory Sample ID	Outfall Grab 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	Outfall Test	Analysis Date	10/12/2021
Laboratory Sample ID	Outfall Test 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	Red Pond	Analysis Date	10/12/2021
Laboratory Sample ID	Red Pond 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.39	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	MW-22	Analysis Date	10/21/2021
Laboratory Sample ID	MW-22 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	100
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	2.1	0.1		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	MW-18D	Analysis Date	10/20/2021
Laboratory Sample ID	MW-18D 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.056	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	MW-64	Analysis Date	10/21/2021
Laboratory Sample ID	MW-64 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.042	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1012211	Preparation Date	10/12/2021
Client Sample ID	MW-32	Analysis Date	10/21/2021
Laboratory Sample ID	MW-32 101121	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/11/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1012211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.015	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1012211
SDG 1012211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/12/21	10/12/2021	15:04:14	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1012211
SDG 1012211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/12/21	10/12/2021	14:19:51	1,4-Dioxane	123-91-1		0.010	0.010	mg/L	Wet	101	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1012211
SDG 1012211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101221 MS	10/12/2021	21:43:20	1,4-Dioxane	123-91-1	0.39	0.40	0.75	mg/L	Wet	89.3	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1012211
SDG 1012211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101221 MSD	10/12/2021	22:27:48	1,4-Dioxane	123-91-1	0.39	0.40	0.70	mg/L	Wet	76.7	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1012211
SDG 1012211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 101221 MS	10/12/2021	21:43:20	1,4-Dioxane	123-91-1	0.75		mg/L	Wet			
Red Pond 101221 MSD	10/12/2021	22:27:48	1,4-Dioxane	123-91-1	0.70	0.72	mg/L	Wet	7.0	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



290 South Wagner Road
Ann Arbor, Michigan 48103
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Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321720

CHAIN OF CUSTODY RECORD

Page 1

PROJECT ID / NUMBER		LABORATORY INFORMATION		SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (if applicable)										
Fall		PO# 4504859621		Date	Fed Ex	UPS	DHL	Courier	Tracking Number					
SAMPLE CUSTODIAN (Print & Signature)		Gage Trendel Gage-Trendel@Fall.com		Date	Fed Ex	UPS	DHL	Courier	Tracking Number					
RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)		DATE / TIME				
Gage Trendel		10/12/21	[Signature]											
RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)		DATE / TIME	RECEIVED BY (Print & Signature)		DATE / TIME				
G-Trendel		9:10	[Signature]											
COMMENTS (Preservation, etc.)				ANALYSIS								MATRIX		
Samples needed by morning 11/5 45 day hold time -> OK				Outfall/Eff samples -> unpreserved All others -> HCl preserved								Indicate Soil/Water/Air Sediment/Sludge Extract		
LINE NO.	BAR CODE	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	PRIORITY NUMBER						
1.	Outfall	10/11/21		✓		Urgent								
2.	Camb - Eff	10/12/21	7:20	✓										
3.	Eff - OC - 1A	10/12/21	7:23	✓										
4.	Eff - OC - 2A	10/12/21	7:25	✓										
5.	BP-1	10/12/21	7:30	✓										
6.	Outfall - Grab	10/12/21	7:35	✓										
7.	Outfall - Text	10/12/21	7:40	✓										
8.	Red Pond	10/12/21	7:15	✓										
9.	MW-22	10/11/21	14:25	✓										
10.	MW-18cl	10/11/21	1500	✓										
11.	MW-64	10/11/21	1059	✓										
12.	MW-32	10/11/21	916	✓										
13.														
14.														
15.														
16.														
17.														
18.														
19.														
20.														



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1013211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1013211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following 27 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/13/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/13/21</i>				
Outfall 001	10/12/21	Urgent	1,4-Dioxane	Water
Red Pond	10/13/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/13/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/13/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/13/21	Urgent	1,4-Dioxane	Water
BP-1	10/13/21	Urgent	1,4-Dioxane	Water
Outfall Grab	10/13/21	Urgent	1,4-Dioxane	Water
Outfall Test	10/13/21	Urgent	1,4-Dioxane	Water
MW-45s	10/12/21	Standard	1,4-Dioxane	Water
MW-45d	10/12/21	Standard	1,4-Dioxane	Water
MW-52s	10/12/21	Standard	1,4-Dioxane	Water
MW-10d	10/12/21	Standard	1,4-Dioxane	Water
TW-2 (Dolph)	10/12/21	Standard	1,4-Dioxane	Water
Comb Eff	10/13/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/13/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/13/21	Urgent	1,4-Dioxane	Water
BP-1	10/13/21	Urgent	1,4-Dioxane	Water
Grab	10/13/21	Urgent	1,4-Dioxane	Water
PW-1	10/13/21	Standard	1,4-Dioxane	Water
TW-18	10/13/21	Standard	1,4-Dioxane	Water
TW-21	10/13/21	Standard	1,4-Dioxane	Water
TW-29	10/13/21	Standard	1,4-Dioxane	Water
TW-28	10/13/21	Standard	1,4-Dioxane	Water
TW-23	10/13/21	Standard	1,4-Dioxane	Water

G001-002.21/CN_1013211.doc

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
TW-22	10/13/21	Standard	1,4-Dioxane	Water
LB-4	10/13/21	Standard	1,4-Dioxane	Water
TW-2 (Dolph)	10/13/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

<u>Analysis</u>	<u>Number of Samples</u>
• 1,4-Dioxane (USEPA 1624) – Urgent TAT	• 13 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
• 1,4-Dioxane (USEPA 1624) – Standard TAT	• 14 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **None**

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP’s and project specifications. In addition, all data conform to the laboratory’s Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions


Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/13/21
- MW-52s 10/12/21
- TW-2 (Dolph) 10/12/21
- PW-1 10/13/21
- TW-21 10/13/21
- TW-28 10/13/21
- TW-22 10/13/21
- TW-2 (Dolph) 10/13/21
- MW-45d 10/12/21
- MW-10d 10/12/21
- TW-18 10/13/21
- TW-29 10/13/21
- TW-23 10/13/21
- LB-4 10/13/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Outfall 001	Analysis Date	10/13/2021
Laboratory Sample ID	Outfall 001 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Red Pond	Analysis Date	10/13/2021
Laboratory Sample ID	Red Pond 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.39	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Comb Eff	Analysis Date	10/13/2021
Laboratory Sample ID	Comb Eff 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/13/2021
Laboratory Sample ID	Eff-OC-1A 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/13/2021
Laboratory Sample ID	Eff-OC-2A 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	BP-1	Analysis Date	10/13/2021
Laboratory Sample ID	BP-1 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Outfall Grab	Analysis Date	10/13/2021
Laboratory Sample ID	Outfall Grab 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Outfall Test	Analysis Date	10/13/2021
Laboratory Sample ID	Outfall Test 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	MW-45S	Analysis Date	10/14/2021
Laboratory Sample ID	MW-45S 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	MW-45D	Analysis Date	10/14/2021
Laboratory Sample ID	MW-45D 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.76	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	MW-52S	Analysis Date	10/14/2021
Laboratory Sample ID	MW-52S 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.19	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	MW-10D	Analysis Date	10/15/2021
Laboratory Sample ID	MW-10D 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.12	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	TW-2 (Dolph)	Analysis Date	10/15/2021
Laboratory Sample ID	TW-2 (Dolph) 101221	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/12/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.12	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Comb Eff #2	Analysis Date	10/13/2021
Laboratory Sample ID	Comb Eff 101322	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Eff-OC-1A #2	Analysis Date	10/13/2021
Laboratory Sample ID	Eff-OC-1A 101322	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Eff-OC-2A #2	Analysis Date	10/13/2021
Laboratory Sample ID	Eff-OC-2A 101322	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.

Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	BP-1 #2	Analysis Date	10/13/2021
Laboratory Sample ID	BP-1 101322	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013211	Preparation Date	10/13/2021
Client Sample ID	Grab #2	Analysis Date	10/13/2021
Laboratory Sample ID	Grab 101322	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013212	Preparation Date	10/13/2021
Client Sample ID	PW-1	Analysis Date	10/23/2021
Laboratory Sample ID	PW-1 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.11	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013212	Preparation Date	10/13/2021
Client Sample ID	TW-18	Analysis Date	10/22/2021
Laboratory Sample ID	TW-18 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.26	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013212	Preparation Date	10/13/2021
Client Sample ID	TW-21	Analysis Date	10/29/2021
Laboratory Sample ID	TW-21 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.24	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013212	Preparation Date	10/13/2021
Client Sample ID	TW-29	Analysis Date	10/29/2021
Laboratory Sample ID	TW-29 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.29	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013212	Preparation Date	10/13/2021
Client Sample ID	TW-28	Analysis Date	10/29/2021
Laboratory Sample ID	TW-28 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.64	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013212	Preparation Date	10/13/2021
Client Sample ID	TW-23	Analysis Date	10/29/2021
Laboratory Sample ID	TW-23 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.38	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013212	Preparation Date	10/13/2021
Client Sample ID	TW-22	Analysis Date	10/29/2021
Laboratory Sample ID	TW-22 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.42	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013212	Preparation Date	10/13/2021
Client Sample ID	LB-4	Analysis Date	10/30/2021
Laboratory Sample ID	LB-4 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.43	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1013212	Preparation Date	10/13/2021
Client Sample ID	TW-2 (Dolph)	Analysis Date	10/30/2021
Laboratory Sample ID	TW-2 (Dolph) 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	5
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1013212	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.1G	0.005		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1013211
SDG 1013211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/13/21	10/13/2021	10:27:03	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

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Oa& |aa} •A^+!{ ^aA iA A } aa *E
U[b&a] ^8aaA^] iA *Aq aA OSaa^aA] [] A[, ^o&aA iaa} A aa aaaaE
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ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1013212
SDG 1013212
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-2 10/13/21	10/21/2021	22:46:32	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

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ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1013211
SDG 1013211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/13/21	10/13/2021	09:42:37	1,4-Dioxane	123-91-1		0.010	0.0095	mg/L	Wet	94.9	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1013211
SDG 1013211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101321 MS	10/13/2021	13:24:09	1,4-Dioxane	123-91-1	0.39	0.40	0.78	mg/L	Wet	97.1	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1013211
SDG 1013211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101321 MSD	10/13/2021	14:15:03	1,4-Dioxane	123-91-1	0.39	0.40	0.78	mg/L	Wet	96.6	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1013212
SDG 1013212
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-2 10/13/21	10/21/2021	22:02:41	1,4-Dioxane	123-91-1		0.010	0.0095	mg/L	Wet	95.3	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1013212
SDG 1013212
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 101321 MS	10/30/2021	02:44:27	1,4-Dioxane	123-91-1		0.010	0.0099	mg/L	Wet	99.2	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1013212
SDG 1013212
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 101321 MSD	10/30/2021	03:28:14	1,4-Dioxane	123-91-1		0.010	0.0094	mg/L	Wet	93.7	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1013211
SDG 1013211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 101321 MS	10/13/2021	13:24:09	1,4-Dioxane	123-91-1	0.78		mg/L	Wet			
Red Pond 101321 MSD	10/13/2021	14:15:03	1,4-Dioxane	123-91-1	0.78	0.78	mg/L	Wet	0.26	20	

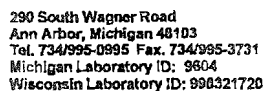
7ca a Ybfg
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Oas' laa) •A^!:{ ^aA!a!A[^) aa*E
U[b&a] ^8aaA^][:a* Aa aQ OSDaa ^aA][] A[, ^•o&aa'aa) Aaa aadâE
T EQaa^•A^çaa^aA^][:a* Aa aha^aA][] Aaa] |^aA' q}E



Method: USEPA 1624
QA/QC Batch Number: QCORG1013212
SDG 1013212
Project Number: G001-002.21
Report Date: 11/4/2021

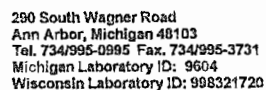
Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
ATS Tap Water 101321 MS	10/30/2021	02:44:27	1,4-Dioxane	123-91-1	0.0099		mg/L	Wet			
ATS Tap Water 101321 MSD	10/30/2021	03:28:14	1,4-Dioxane	123-91-1	0.0094	0.0096	mg/L	Wet	5.6	20	

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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1014211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1014211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following 12 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/14/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/14/21</i>				
Outfall 001	10/13/21	Urgent	1,4-Dioxane	Water
Red Pond	10/14/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/14/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/14/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/14/21	Urgent	1,4-Dioxane	Water
BP-1	10/14/21	Urgent	1,4-Dioxane	Water
Grab	10/14/21	Urgent	1,4-Dioxane	Water
Outfall Test	10/14/21	Urgent	1,4-Dioxane	Water
MW-48	10/13/21	Standard	1,4-Dioxane	Water
MW-49	10/13/21	Standard	1,4-Dioxane	Water
MW-46	10/13/21	Standard	1,4-Dioxane	Water
MW-50	10/13/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 8 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
- 4 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP’s and project specifications. In addition, all data conform to the laboratory’s Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

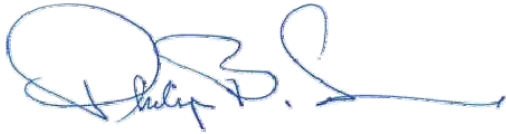
Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/14/21
- MW-50 10/13/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	Outfall 001	Analysis Date	10/14/2021
Laboratory Sample ID	Outfall 001 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.004	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	Red Pond	Analysis Date	10/14/2021
Laboratory Sample ID	Red Pond 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.36	004		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	Comb Eff	Analysis Date	10/14/2021
Laboratory Sample ID	Comb Eff 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/14/2021
Laboratory Sample ID	Eff-OC-1A 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/14/2021
Laboratory Sample ID	Eff-OC-2A 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	BP-1	Analysis Date	10/14/2021
Laboratory Sample ID	BP-1 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	Outfall Grab	Analysis Date	10/14/2021
Laboratory Sample ID	Outfall Grab 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	Outfall Test	Analysis Date	10/14/2021
Laboratory Sample ID	Outfall Test 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	MW-48	Analysis Date	10/15/2021
Laboratory Sample ID	MW-48 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.015	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	MW-49	Analysis Date	10/15/2021
Laboratory Sample ID	MW-49 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	MW-46	Analysis Date	10/15/2021
Laboratory Sample ID	MW-46 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.072	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1014211	Preparation Date	10/14/2021
Client Sample ID	MW-50	Analysis Date	10/15/2021
Laboratory Sample ID	MW-50 101321	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/13/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	20
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1014211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.50	0.02		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1014211
SDG 1014211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/14/21	10/14/2021	14:14:18	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1014211
SDG 1014211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/4/21	10/14/2021	13:11:27	1,4-Dioxane	123-91-1		0.010	0.0098	mg/L	Wet	97.9	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1014211
SDG 1014211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101421 MS	10/14/2021	16:26:10	1,4-Dioxane	123-91-1	0.36	0.40	0.71	mg/L	Wet	88.7	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1014211
SDG 1014211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101421 MSD	10/14/2021	17:10:09	1,4-Dioxane	123-91-1	0.36	0.40	0.70	mg/L	Wet	86.6	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

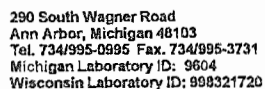
Method: USEPA 1624
QA/QC Batch Number: QCORG1014211
SDG 1014211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 101421 MS	10/14/2021	16:26:10	1,4-Dioxane	123-91-1	0.71		mg/L	Wet			
Red Pond 101421 MSD	10/14/2021	17:10:09	1,4-Dioxane	123-91-1	0.70	0.71	mg/L	Wet	1.2	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1015211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1015211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following 16 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/15/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/15/21</i>				
Outfall 001	10/14/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/15/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/15/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/15/21	Urgent	1,4-Dioxane	Water
BP-1	10/15/21	Urgent	1,4-Dioxane	Water
Eff.-Grab	10/15/21	Urgent	1,4-Dioxane	Water
Outfall Test	10/15/21	Urgent	1,4-Dioxane	Water
Red Pond	10/15/21	Urgent	1,4-Dioxane	Water
MW-129I	10/14/21	Standard	1,4-Dioxane	Water
MW-129S	10/14/21	Standard	1,4-Dioxane	Water
MW-129d	10/14/21	Standard	1,4-Dioxane	Water
MW-107	10/14/21	Standard	1,4-Dioxane	Water
TW-5	10/14/21	Standard	1,4-Dioxane	Water
TW-11	10/14/21	Standard	1,4-Dioxane	Water
TW-14	10/14/21	Standard	1,4-Dioxane	Water
TW-17	10/14/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 8 Samples
- 8 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the "Sample Receipt" section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **None**

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/15/21
- TW-5 10/14/21
- TW-14 10/14/21
- MW-107 10/14/21
- TW-11 10/14/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	Outfall 001	Analysis Date	10/15/2021
Laboratory Sample ID	Outfall 001 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	Comb Eff	Analysis Date	10/15/2021
Laboratory Sample ID	Comb Eff 101521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/15/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.004	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/15/2021
Laboratory Sample ID	Eff-OC-1A 101521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/15/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/15/2021
Laboratory Sample ID	Eff-OC-2A 101521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/15/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.004	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	BP-1	Analysis Date	10/15/2021
Laboratory Sample ID	BP-1 101521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/15/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.004	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	Outfall Grab	Analysis Date	10/15/2021
Laboratory Sample ID	Outfall Grab 101521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/15/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.004	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	Outfall Test	Analysis Date	10/15/2021
Laboratory Sample ID	Outfall Test 101521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/15/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.004	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	Red Pond	Analysis Date	10/15/2021
Laboratory Sample ID	Red Pond 101521	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/15/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.33	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	MW-129I	Analysis Date	10/30/2021
Laboratory Sample ID	MW-129I 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	MW-129S	Analysis Date	10/30/2021
Laboratory Sample ID	MW-129S 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	MW-129D	Analysis Date	10/30/2021
Laboratory Sample ID	MW-129D 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.002	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	MW-107	Analysis Date	10/30/2021
Laboratory Sample ID	MW-107 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	20
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.53	0.02		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	TW-5	Analysis Date	10/30/2021
Laboratory Sample ID	TW-5 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.59	0.04		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	TW-11	Analysis Date	10/30/2021
Laboratory Sample ID	TW-11 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.16	0.01		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	TW-14	Analysis Date	10/30/2021
Laboratory Sample ID	TW-14 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	5
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.11	0.005		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1015211	Preparation Date	10/15/2021
Client Sample ID	TW-17	Analysis Date	10/30/2021
Laboratory Sample ID	TW-17 101421	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/14/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	5
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1015211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.077	0.005		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1015211
SDG 1015211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/15/21	10/15/2021	05:37:59	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1015211
SDG 1015211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/15/21	10/15/2021	04:54:03	1,4-Dioxane	123-91-1		0.010	0.0097	mg/L	Wet	97.2	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1015211
SDG 1015211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 10/15/21 MS	10/15/2021	06:21:46	1,4-Dioxane	123-91-1		0.40	0.42	mg/L	Wet	104	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1015211
SDG 1015211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
ATS Tap Water 10/15/21 MSD	10/15/2021	07:05:37	1,4-Dioxane	123-91-1		0.40	0.38	mg/L	Wet	93.8	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

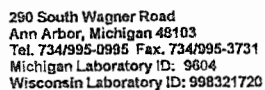
Method: USEPA 1624
QA/QC Batch Number: QCORG1015211
SDG 1015211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
ATS Tap Water 10/15/21 MS	10/15/2021	06:21:46	1,4-Dioxane	123-91-1	0.42		mg/L	Wet			
ATS Tap Water 10/15/21 MSD	10/15/2021	07:05:37	1,4-Dioxane	123-91-1	0.38	0.40	mg/L	Wet	10	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



Page 1

PROJECT ID / NUMBER Pall		LABORATORY INFORMATION PO# 4504859621		SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (If applicable)																																									
SAMPLE CUSTODIAN (Print & Signature) Gage Trendel				DATE / TIME 10/15/21				RECEIVED BY (Print & Signature) Gage Trendel @ Pall.com				Date		Fed Ex		UPS		DHL		Courier		Tracking Number																							
RELINQUISHED BY (Print & Signature) Gage Trendel				DATE / TIME 10/15/21				RECEIVED BY (Print & Signature) [Signature]				Date		Fed Ex		UPS		DHL		Courier		Tracking Number																							
RELINQUISHED BY (Print & Signature) [Signature]				DATE / TIME 8:30				RECEIVED BY (Print & Signature) [Signature]				Date		Fed Ex		UPS		DHL		Courier		Tracking Number																							
COMMENTS (Preservation, etc.) Samples needed by 11/5 45 day hold time → OK				Outfall Effluents → unpreserved All others → HCl preserved																																									
LINE NO.				BAR CODE				DATE				TIME				COMP.				GRAB				SAMPLE IDENTIFICATION				NO. OF CONTAINERS		PRIORITY NUMBER		ANALYSIS												MATRIX Indicate Soil/Water/Air Sediment/Sludge Extract	
1.				Outfall				10/14/21																Urgent																					
2.				Comb. Eff				10/15/21				08:05																																	
3.				EFF-OC-1A				10/15/21				08:10																																	
4.				EFF-OC-2A				10/15/21				08:10																																	
5.				BP-1				10/15/21				08:15																																	
6.				EFF. - Grab				10/15/21				08:20																																	
7.				Outfall - Test				10/15/21				08:25																																	
8.				Comb. Eff. Red Pond				10/15/21				08:00																																	
9.				MW-129I				10/14/21				1008																																	
10.				MW-129S				10/14/21				1118																																	
11.				MW-129d				10/14/21				1227																																	
12.				MW-107				10/14/21				1140																																	
13.				TW-5				10/14/21				1050																																	
14.				TW-11				10/14/21				1055																																	
15.				TW-14				10/14/21				1100																																	
16.				TW-17				10/14/21				1105																																	
17.																																													
18.																																													



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1018211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1018211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following 11 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/18/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/18/21</i>				
Outfall 001	10/17/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/18/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/18/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/18/21	Urgent	1,4-Dioxane	Water
BP-1	10/18/21	Urgent	1,4-Dioxane	Water
OF-Grab	10/18/21	Urgent	1,4-Dioxane	Water
OF-Test	10/18/21	Urgent	1,4-Dioxane	Water
Red Pond	10/18/21	Urgent	1,4-Dioxane	Water
MW-142 (38-46')	10/18/21	Urgent	1,4-Dioxane	Water
MW-142 (56')	10/18/21	Urgent	1,4-Dioxane	Water
MW-142 (66')	10/18/21	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT

Number of Samples

- 11 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **The following samples were received un-preserved and analyzed at native pH.**
 - MW-142 (38-46’) 10/18/21
 - MW-142 (56’) 10/18/21
 - MW-142 (66’) 10/18/21

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP’s and project specifications. In addition, all data conform to the laboratory’s Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

Lab Sample ID	Constituent	Percent Recovery	Acceptance Limits
Red Pond 10/18/21 MSD	1,4-Dioxane	78.5	80-120%

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

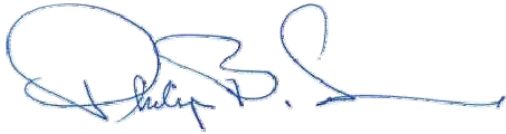
Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/18/21



_____/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



_____/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	Outfall 001	Analysis Date	10/18/2021
Laboratory Sample ID	Outfall 001 101721	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/17/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	Comb Eff	Analysis Date	10/18/2021
Laboratory Sample ID	Comb Eff 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/18/2021
Laboratory Sample ID	Eff-OC-1A 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/18/2021
Laboratory Sample ID	Eff-OC-2A 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.005	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	BP-1	Analysis Date	10/18/2021
Laboratory Sample ID	BP-1 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	Outfall Grab	Analysis Date	10/18/2021
Laboratory Sample ID	Outfall Grab 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	Outfall Test	Analysis Date	10/18/2021
Laboratory Sample ID	Outfall Test 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	Red Pond	Analysis Date	10/18/2021
Laboratory Sample ID	Red Pond 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.43	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	MW-142 (38-46')	Analysis Date	10/19/2021
Laboratory Sample ID	MW-142 (38-46') 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	MW-142 (56')	Analysis Date	10/19/2021
Laboratory Sample ID	MW-142 (56') 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1018211	Preparation Date	10/18/2021
Client Sample ID	MW-142 (66')	Analysis Date	10/19/2021
Laboratory Sample ID	MW-142 (66') 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1018211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1018211
SDG 1018211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/18/21	10/18/2021	09:34:19	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1018211
SDG 1018211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/18/21	10/18/2021	08:47:33	1,4-Dioxane	123-91-1		0.010	0.0094	mg/L	Wet	94.1	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1018211
SDG 1018211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101821 MS	10/18/2021	22:20:28	1,4-Dioxane	123-91-1	0.43	0.40	0.82	mg/L	Wet	96.8	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1018211
SDG 1018211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101821 MSD	10/18/2021	23:04:21	1,4-Dioxane	123-91-1	0.43	0.40	0.75	mg/L	Wet	78.5	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

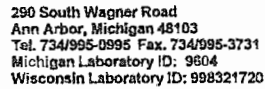
Method: USEPA 1624
QA/QC Batch Number: QCORG1018211
SDG 1018211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 101821 MS	10/18/2021	22:20:28	1,4-Dioxane	123-91-1	0.82		mg/L	Wet			
Red Pond 101821 MSD	10/18/2021	23:04:21	1,4-Dioxane	123-91-1	0.75	0.78	mg/L	Wet	9.4	20	

Comments

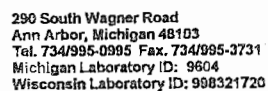
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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1018.211

PROJECT ID / NUMBER Pall		LABORATORY INFORMATION PO# 4504859621		SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (if applicable)													
SAMPLE CUSTODIAN (Print & Signature) Gage Trenchel Gage-Trenchel@Pall.com				Date		Fed Ex		UPS		DHL		Courier		Tracking Number			
				Date		Fed Ex		UPS		DHL		Courier		Tracking Number			
				Date		Fed Ex		UPS		DHL		Courier		Tracking Number			
				Date		Fed Ex		UPS		DHL		Courier		Tracking Number			
RELINQUISHED BY (Print & Signature) Gage Trenchel		DATE / TIME 10/18/21		RECEIVED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME			
RELINQUISHED BY (Print & Signature) G-Trenchel		DATE / TIME 9:45		RECEIVED BY (Print & Signature) [Signature]		DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME			
COMMENTS (Preservation, etc.) Samples needed in 24 hrs 45 day hold time -> OK																	
ANALYSIS																	
MATRIX Indicate Soil/Water/Air Sediment/Sludge Extract																	
LINE NO.	BAR CODE	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION										NO. OF CONTAINERS	PRIORITY NUMBER
1.	Outfall	10/17/21				Urgent											
2.	Comb-EPF	10/18/21	7:15														
3.	EPF-OC-1A	10/18/21	7:20														
4.	EPF-OC-2A	10/18/21	7:20														
5.	BP-1	10/18/21	7:25														
6.	OF-Grab	10/18/21	7:30														
7.	OF-Test	10/18/21	7:35														
8.	Reel Panel	10/18/21	7:10														
9.																	
10.																	
11.																	
12.																	
13.																	
14.																	
15.																	
16.																	
17.																	
18.																	
19.																	
20.																	



Page 1

PROJECT ID / NUMBER PALL Samples		LABORATORY INFORMATION PO# 4504859621		SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (if applicable)																								
SAMPLE CUSTODIAN (Print & Signature) Mitch Dominski / Med				Date		Fed Ex		UPS		DHL		Courier		Tracking Number														
				Date		Fed Ex		UPS		DHL		Courier		Tracking Number														
				Date		Fed Ex		UPS		DHL		Courier		Tracking Number														
				Date		Fed Ex		UPS		DHL		Courier		Tracking Number														
RELINQUISHED BY (Print & Signature) //		DATE / TIME 10/18 1630		RECEIVED BY (Print & Signature) 3		DATE / TIME		RELINQUISHED BY (Print & Signature)				DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME												
RELINQUISHED BY (Print & Signature)		DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME		RELINQUISHED BY (Print & Signature)				DATE / TIME		RECEIVED BY (Print & Signature)		DATE / TIME												
COMMENTS (Preservation, etc.) Rush - 24hr turnaround																												
ANALYSIS																												
MATRIX: Indicate Sol/Water/Air Sediment/Sludge Extract																												
LINE NO.	BAR CODE	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION										NO. OF CONTAINERS	PRIORITY NUMBER	ANALYSIS										MATRIX: Indicate Sol/Water/Air Sediment/Sludge Extract
1.		10/18/01	1301		✓	MW-142 (38-46')										2		X										<10
2.		10/18/01	1355		✓	MW-142 (56')										2		X										<10
3.		10/18/01	1445		✓	MW-142 (66')										2		X										<10
4.																												
5.																												
6.																												
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17.																												



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1019211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1019211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following ten samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/19/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/19/21</i>				
Outfall 001	10/18/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/19/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/19/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/19/21	Urgent	1,4-Dioxane	Water
BP-1	10/19/21	Urgent	1,4-Dioxane	Water
Outfall-Test	10/19/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	10/19/21	Urgent	1,4-Dioxane	Water
Red Pond	10/19/21	Urgent	1,4-Dioxane	Water
TW-20	10/18/21	Standard	1,4-Dioxane	Water
TW-24	10/18/21	Standard	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT
- 1,4-Dioxane (USEPA 1624) – Standard TAT

Number of Samples

- 8 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
- 2 Samples

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- None

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

- **None**

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- TW-20 10/18/21
- TW-24 10/18/21
- Red Pond 10/19/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	Outfall 001	Analysis Date	10/19/2021
Laboratory Sample ID	Outfall 001 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	Comb Eff	Analysis Date	10/19/2021
Laboratory Sample ID	Comb Eff 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/19/2021
Laboratory Sample ID	Eff-OC-1A 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/19/2021
Laboratory Sample ID	Eff-OC-2A 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	BP-1	Analysis Date	10/19/2021
Laboratory Sample ID	BP-1 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	Outfall Test	Analysis Date	10/19/2021
Laboratory Sample ID	Outfall Test 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	Outfall Grab	Analysis Date	10/19/2021
Laboratory Sample ID	Outfall Grab 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.007	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	Red Pond	Analysis Date	10/19/2021
Laboratory Sample ID	Red Pond 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.41	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	TW-20	Analysis Date	10/19/2021
Laboratory Sample ID	TW-20 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	10
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.83	0.01		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1019211	Preparation Date	10/19/2021
Client Sample ID	TW-24	Analysis Date	10/19/2021
Laboratory Sample ID	TW-24 101821	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/18/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1019211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	1.8	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1019211
SDG 1019211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/19/21	10/19/2021	11:34:09	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1019211
SDG 1019211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/19/21	10/19/2021	10:50:11	1,4-Dioxane	123-91-1		0.010	0.0094	mg/L	Wet	94.5	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1019211
SDG 1019211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101921 MS	10/19/2021	19:25:16	1,4-Dioxane	123-91-1	0.41	0.40	0.82	mg/L	Wet	103	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1019211
SDG 1019211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 101921 MSD	10/19/2021	20:09:13	1,4-Dioxane	123-91-1	0.41	0.40	0.78	mg/L	Wet	91.5	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1019211
SDG 1019211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 101921 MS	10/19/2021	19:25:16	1,4-Dioxane	123-91-1	0.82		mg/L	Wet			
Red Pond 101921 MSD	10/19/2021	20:09:13	1,4-Dioxane	123-91-1	0.78	0.80	mg/L	Wet	5.9	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321720

CHAIN OF CUSTODY RECORD

Page 1

PROJECT ID / NUMBER		LABORATORY INFORMATION		SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (If applicable)														
Pall		PO# 4504859621		Date	Fed Ex	UPS	DHL	Courier	Tracking Number									
SAMPLE CUSTODIAN (Print & Signature)		Gage Trenelle Gage-Trenelle@Pall.com		Date	Fed Ex	UPS	DHL	Courier	Tracking Number									
RELINQUISHED BY (Print & Signature)		Gage Trenelle		DATE / TIME					DATE / TIME	RELINQUISHED BY (Print & Signature)				DATE / TIME				
RELINQUISHED BY (Print & Signature)		Gage Trenelle		DATE / TIME					DATE / TIME	RELINQUISHED BY (Print & Signature)				DATE / TIME				
COMMENTS (Preservation, etc.)		Samples needed by 11/5 45 day hold time -> OK		all / EFF -> unpreserved all others -> HCl preserved														
LINE NO.	BAR CODE	DATE	TIME	COMP.	GRAB	ANALYSIS												MATRIX Indicate Soli/Water/Air Sediment/Sludge Extract
1.	Outfall 1	10/18/21																
2.	Comb - EFF	10/19/21	7:10															
3.	EFF - OC - 1A	10/19/21	7:15															
4.	EFF - OC - 2A	10/19/21	7:15															
5.	BP-1	10/19/21	7:20															
6.	Outfall 1 - Test	10/19/21	7:25															
7.	Outfall 1 - Grab	10/19/21	7:30															
8.	Red Pond	10/19/21	7:05															
9.	TW-20	10/18/21	12:40															
10.	TW-24	10/18/21	10:25															
11.																		
12.																		
13.																		
14.																		
15.																		
16.																		
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18.																		
19.																		
20.																		



ORGANIC ANALYSIS

**1,4-Dioxane by GC/MS
USEPA 1624**

ATS Project Number: G001-002.21

ATS SDG: 1020211

Prepared By:

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103



LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 11/4/21

SRF / SDG Number(s): 1020211

Client PO Number: 4504859621

Case Narrative Summary

This case narrative applies to the following 11 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 10/20/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
<i>Received 10/20/21</i>				
Outfall 001	10/19/21	Urgent	1,4-Dioxane	Water
Comb Eff	10/20/21	Urgent	1,4-Dioxane	Water
Eff-OC-1A	10/20/21	Urgent	1,4-Dioxane	Water
Eff-OC-2A	10/20/21	Urgent	1,4-Dioxane	Water
BP-1	10/20/21	Urgent	1,4-Dioxane	Water
Outfall-Grab	10/20/21	Urgent	1,4-Dioxane	Water
Outfall-Test	10/20/21	Urgent	1,4-Dioxane	Water
Red Pond	10/20/21	Urgent	1,4-Dioxane	Water
MW-142 (72')	10/19/21	Urgent	1,4-Dioxane	Water
MW-142 (107'-112')	10/19/21	Urgent	1,4-Dioxane	Water
MW-142 (128'-133')	10/19/21	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis

- 1,4-Dioxane (USEPA 1624) – Urgent TAT

Number of Samples

- 11 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the “Sample Receipt” section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- **The following samples were received un-preserved and analyzed at native pH.**
 - MW-142 (72') 10/19/21

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written standard operating procedures (SOPs) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

A single QA/QC batch is defined as no more than 20 samples excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (MS, SPK), and duplicates whether spiked or native (MSD, SPK DUP, DUP, LR).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- **None**

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis of a mid-level initial calibration verification (CV) standard at a frequency of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- **None**

Instrument Blanks

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- **None**

QA/QC Batch Summary

Internal Standards

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- **None**

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- **None**

Laboratory Fortified Blanks / Laboratory Control Samples

A laboratory fortified blank (LFB) was analyzed with each QA/QC batch. The LFB's met the acceptance criteria with the following exceptions:

- **None**

Matrix Spikes and Spike Duplicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD's met the acceptance criteria with the following exceptions:

Lab Sample ID	Constituent	Percent Recovery	Acceptance Limits
Red Pond 10/20/21 MSD	1,4-Dioxane	78.5	80-120%

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The replicates met the acceptance criteria with the following exceptions:

- **None**

Sample Dilutions

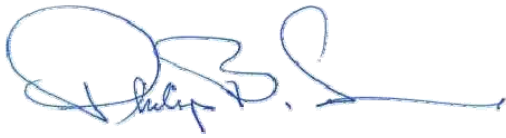
Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 10/20/21



/ November 4, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ November 4, 2021

Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	Outfall 001	Analysis Date	10/20/2021
Laboratory Sample ID	Outfall 001 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	Comb Eff	Analysis Date	10/20/2021
Laboratory Sample ID	Comb Eff 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	Eff-OC-1A	Analysis Date	10/20/2021
Laboratory Sample ID	Eff-OC-1A 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	Eff-OC-2A	Analysis Date	10/20/2021
Laboratory Sample ID	Eff-OC-2A 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.009	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	BP-1	Analysis Date	10/20/2021
Laboratory Sample ID	BP-1 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	Outfall Grab	Analysis Date	10/20/2021
Laboratory Sample ID	Outfall Grab 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	Outfall Test	Analysis Date	10/20/2021
Laboratory Sample ID	Outfall Test 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.008	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	Red Pond	Analysis Date	10/20/2021
Laboratory Sample ID	Red Pond 102021	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/20/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	40
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.40	0.04		M

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	MW-142 (72')	Analysis Date	10/20/2021
Laboratory Sample ID	MW-142 (72') 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	MW-142 (107-112')	Analysis Date	10/20/2021
Laboratory Sample ID	MW-142 (107-112') 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



1,4-Dioxane by GC/MS Data Summary Sheet

ATS Project Number	G001-002.21	Percent Moisture	100
ATS SDG Number	1020211	Preparation Date	10/20/2021
Client Sample ID	MW-142 (128-133')	Analysis Date	10/20/2021
Laboratory Sample ID	MW-142 (128-133') 101921	Instrument	2100V
Matrix	Water	Subsample (mL)	5
Sample Date	10/19/2021	Final Volume (mL)	5
Analytical Method (USEPA)	USEPA 1624	Dilution Factor	1
Preparation Method (USEPA)	USEPA 1624	Basis	Wet
QC Batch Number	QCORG1020211	Units	mg/L

Parameter	Chemical Identifier	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1020211
SDG 1020211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Comments
LRB-1 10/20/21	10/20/2021	10:52:42	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1020211
SDG 1020211
Project Number: G001-002.21
Report Date: 11/4/2021

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
LCS-1 10/20/21	10/20/2021	11:37:35	1,4-Dioxane	123-91-1		0.010	0.0093	mg/L	Wet	92.8	85	115	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1020211
SDG 1020211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102021 MS	10/20/2021	19:02:01	1,4-Dioxane	123-91-1	0.40	0.40	0.75	mg/L	Wet	86.6	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG1020211
SDG 1020211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Comments
Red Pond 102021 MSD	10/20/2021	19:46:02	1,4-Dioxane	123-91-1	0.40	0.40	0.72	mg/L	Wet	78.5	80	120	

Comments

All methods reference US EPA methods unless otherwise noted.

Calculations performed prior to rounding.

Project specific reporting limit (MDL) based upon lowest calibration standard.

M - Indicates elevated reporting limit based upon sample dilution.



ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

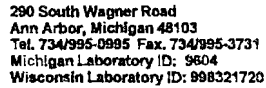
Method: USEPA 1624
QA/QC Batch Number: QCORG1020211
SDG 1020211
Project Number: G001-002.21
Report Date: 11/4/2021

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Comments
Red Pond 102021 MS	10/20/2021	19:02:01	1,4-Dioxane	123-91-1	0.75		mg/L	Wet			
Red Pond 102021 MSD	10/20/2021	19:46:02	1,4-Dioxane	123-91-1	0.72	0.73	mg/L	Wet	4.4	20	

Comments

All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.



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